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I

PSYCHOANALYSIS AND NEUROSCIENCE
Introduction

FRED M. LEVIN
ARNOLD WILSON

Most of the essays in Section I of this volume were gathered from two important conferences: The 65th Anniversary Symposium of the Chicago Psychoanalytic Institute, March 21–22, 1998, on Psychoanalysis, Neurobiology, and Therapeutic Change, and the Chicago Institute and Analytic Society sponsored Festschrift Symposium for John E. Gedo, October 18, 1997. All the papers in this volume were chosen for the Annual of Psychoanalysis because, in our judgment, they represent cutting-edge contemporary thinking and research that is brought to bear on psychoanalytic theory and technique. The reader will notice that many of the essays make extensive use of the ideas of two seminal thinkers of our times, John Gedo and Gerald Edelman.

In her important paper, Virginia Barry investigates the psychoanalytic theory of internalization. Based partly on some implications and points of convergence with the Neural Darwinism of Edelman, she spans the realms of neuroscience, cognitive science, and developmental psychology as she operationalizes how new learning takes place within clinical psychoanalysis.

The new-look theories provide us with important leverage for investigating how psychoanalysis works. Barbara Fajardo approaches change within analysis from the vantage point of "breaks in consciousness," emphasizing Edelman's view that mental reorganization and psychological development are distinctly different entities. To Fajardo, the key to treatment, however, is overcoming the disavowal that obtains in patients who experience their conflicting mental states serially, rather than simultaneously.

Thirty years ago, Susan Fisher published a remarkable essay on the treatment of an autistic child. In her current essay, she returns to this earlier one, remembering the progress, passion, and the pain of the child's frighteningly vulnerable self in a virtually nonexistent world. This time around, however, she evaluates the experience against the backdrop of theoretical innovation: notably Gedo's
Introduction

hierarchical model and its relationship to the myriad psychobiological discoveries that reframe such complex human experience. Readers will appreciate the author’s respect for uncertainty, for the many unanswered questions raised, and the absence of reductionism.

The approach to motivation can now be examined in a new light. June Hadley proposes a neurobiologically distinct motivational system devoted to the development and sustaining of autonomy. Insisting that psychoanalytic theory be consistent with current neurophysiology, she describes how this system is closely related to the attachment system, and optimally leads to the formation of a sturdy and successful self.

In their contribution, Fred Levin and Colwyn Trevarthen examine the twin functions of conscious and unconscious process and their relationship to the executive control network (ECN) of the brain (that is, the research of Michael Posner). Parallels are drawn between shifts of low- versus high-level cognitive modes and shifts of unconscious/conscious processing strategies. Reviewing some extremely innovative work by Shevrin and Opatow, they describe the function of consciousness as attending to real-world adaptation via learning, as the unconscious assures that conscious efforts incorporate essential private wishes, fears, values, and goals. From this perspective the psychoanalyst represents a novel object in nature, one who stands for the outer world yet simultaneously respects the patient’s inner world.

In a companion article, Levin goes on to advance the argument that chaos theory makes three essential contributions to our field: (1) it provides a general vocabulary for novel perspectives on transference and for change within psychoanalysis; (2) it establishes a framework for better understanding specific aspects of learning, development, and psychopathology; and (3) through various kinds of modeling, it stimulates the rethinking of venerable psychoanalytic theories.

From many vantage points, theorists are responding to the challenge of how to model the mind. In such a vein, Arnold Modell seeks a more refined answer to the question of just how the mind’s elements might be hierarchically ordered. Although he ends with no decisive conclusion regarding this central question, he clearly favors viewing development as something other than an orderly sequence, much preferring the idea of change as recontextualization, akin to Freud’s concept of nachträglichkeit. From Modell’s perspective, mental functions are always context driven, hence his admonition that we avoid attaching value judgments which equate the “higher” (more mature) function with what is better and the “lower” (more primitive) function with what is worse.

In his second essay, Modell echoes some of his most creative earlier work (e.g., Modell, 1993), covering his viewpoint on metaphor as the meeting point of disciplines, and as a functional unit of a multipotential mind. Like Winnicott, Modell has long argued for the criticality of the holding environment, while
seeking the details of exactly what such “holding” means. For him, the capacity to think metaphorically may have appeared in the evolution of our species before language itself. Metaphor, as he sees it, is no mere structure of speech; it is part of the developing mind and brain and thus the very means by which cognition itself occurs.

Based on his experience as analyst, and as mentor for historians, George Moraitis criticizes psychoanalysis for its slowness in responding to Gedo’s invitation to integrate its findings with the imaginative insights of neuroscience and cognitive psychology, a movement that he believes is providing an opportunity for our field to reclaim its scientific status. The general tendency to see such novel interdisciplinary efforts as “irrelevant” to psychoanalysis is, in his view, nothing less than self-serving, defensive isolationism.

As part of his long-standing interest in the evolution of theories and how they operate, Leo Sadow examines the role of theory in the evolution of psychoanalytic practice. Sadow details the potential uses and abuses theory undergoes historically within psychoanalysis.

Perhaps no single individual has moved the interface of psychoanalysis and cognitive neuroscience along as profoundly as Mark Solms. In this volume, Solms presents a unique bridging of psychoanalysis and the neurophysiology of dreaming, based on his understanding of Freud’s efforts to refine his methods for analyzing psychological and biological data by means of functional pattern matching (syndromic analysis).

Taken together, this collection of essays constitutes a forward-looking paean to the legacy of mind/brain research. This volume is squarely aimed at the future rather than the past of psychoanalysis. We emphasize this because it is the Editors’ view that psychoanalysis can only live on and flourish by dint of the strength, vigor, and flexibility of its ideas, not merely as a consequence of the number of patients treated using its famous method. Only time will tell the future of psychoanalysis. The force of the essays in this volume, however, do suggest the possibility of a happy outcome—that an intellectually and scientifically sound, psychobiologically sophisticated, hierarchically ordered, and culturally enriched psychoanalysis is making a strong bid to establish itself, in the contemporary world of pluralistic psychoanalysis, as a set of ideas and hypotheses to be reckoned with by anyone seriously interested in psychoanalysis.

Reference

Reflections on Interactive and Self-Organizing Aspects of Learning in Psychoanalysis

VIRGINIA C. BARRY

Many disciplines have wrestled with the topic of how human experience of the world is integrated and internalized by the individual. Psychoanalysts traditionally have addressed how unconscious processes influence perception and interpretation of experience; developmentalists address how maturation limits or enhances the manner in which experience can be processed; semioticians and linguists address the hierarchical nature of the use of signs and language; and neuroscientists have elaborated theories of how the brain is capable of interacting with the world and transforming lived experience into symbolic form. With the exception of psychoanalysis, each discipline has laid out what might be called "rules of transformation." Such rules seek to operationalize developmental/linguistic/neurological functions, and, in so doing, hypothesize how experience in each mode is metabolized and transformed from the experiential to the symbolic. The psychoanalytic theory of internalization has not yet been operationalized into a theory of learning.

In treating certain characterologic problems, I, like others, have found that the kinds of interventions that promote change are "beyond interpretation" (Gedo, 1993). Certain problems require from me an affective response embedded in an increasingly predictable interaction which allows new learning to occur. Although I have intuitively understood this was necessary, psychoanalytic theory was deficient in explaining the mechanism of change. It is from the fields of neuroscience, cognitive science, and developmental psychology that I have found a way to quantify and perhaps operationalize new learning, and it is Edelman who I would like to acknowledge as providing for me a new way of thinking about these clinical matters. I have found Edelman's hypotheses (1987, 1989, 1992) relevant in thinking about issues of enactment and disavowal in psychoanalysis, and although what I would like to present today is related, it actually takes off from a different point in his theory.
To demonstrate my correlations, I present a patient who, under the impact of a primarily verbally abusive father (although occasionally physically abusive as well), was unable to form intimate relationships out of a defensive need to avoid situations of anger, which had a paralyzing (and perhaps disorganizing) effect on her, much in the way, I believe that she had become cognitively paralyzed when her father yelled at her. She was unable to learn about certain emotional interactions because of having to ward off traumatic repetitions, and for, what I consider to be new learning to occur, she had to form new emotional/affective categories through actual, routinized, repeated interactions with me. Described from the viewpoint of developmental psychology, the interactions appeared similar to the coerced mirroring of early dyadic relationships with progression first to an enactive process of mutual recognition, and later to a symbolically encoded form of recognition. From a cognitive science point of view, the nonlinguistic interactions conformed to ideas that suggest that basic-level categorizations are formed at the level of gestalt perceptions with categorization based on how the individual interacts with the object. From Edelman’s (1992) perspective, new categorical learning required a motor component interacting in real-time with sensory detectors.

Before presenting the clinical material, I will introduce the relevant ideas from each of these disciplines, briefly, but with an emphasis on how action is integral to new learning. New learning is contingent on the ongoing capacity to categorize and recategorize. Categorization is basic to our thought, perception, action, and speech. As Barthes (1977) said, following the lines of thinking of Bruner (1990) and Piaget (in Gruber and Vonèche, 1977), there is no perception without immediate categorization. We automatically and unconsciously categorize both concrete and abstract things and events that affect our intentions and actions in the world. The self-organizing operation of our brains lends itself to this automatic categorization process. Categories are formed first in conjunction with the way the body interacts with the world (Lakoff, 1987). Bodily experiences, and then imaginative mechanisms, are central to our interpretation of the world, and hence our conceptual systems are directly grounded in perception, body movement, and experience of a physical and social character. The first categorizations occur at a protolinguistic level, which means that the ability to use symbols and language is not essential to basic category formation, but forms the underpinnings of future linguistic categorizations. For example, children can be tested to evaluate how they categorize objects. In early experiments, children were asked to sort cards depicting such objects as animals, furniture, vehicles, and so on. Because 3-year-olds were unable to sort animals into one category (i.e., put the dog, cat, and cow cards into one pile), it was thought that 3-year-olds could not categorize. However, if they were shown images of, for example, different breeds of dogs, or different kinds of chairs, they had no difficulty in sorting the items into relevant categories. Category formation at this level is
designated the basic-level. It is neither the most specific level of categorization nor the most general, but the level at which categorization begins and depends on experiential aspects of human psychology, including gestalt perception, mental imagery, motor activities, social function, and memory. This level of categorization codes at the level of distinctive actions, or the manner in which an individual interacts with the object. For example, a chair—an object with a seat, back, and four legs—can be sat on; a dog can be petted. This level of categorization can be conceived of as a natural level of categorization as opposed to a level created by “achievements of the imagination.”

To reiterate, elementary category formation requires an experiential, interactive effort.

Edelman (1989, 1992) addresses the experiential component as he explores the functional and structural requirements of the brain as it carries out the “fundamental task of psychological development,” namely, perceptual categorization. Recall that Edelman considers brain science to be a science of recognition in that animals seek adaptive matches to their environment. Categories emerge from the dynamic interactions of groups of neurons, and these “mappings” or categories self-organize through their reciprocal interactions. Edelman makes five claims about the origin of categories:

1. The system used to develop categories is degenerate in that there are multiple, disjunctive processes that operate over the same input in real time. This means that an event is processed through different channels of perception, for example, visual, auditory, kinesthetic, affective, and so on, as well as through motoric channels.
2. Categories develop from the reentrant mapping of these disjunctive samples of the perceptual space.
3. The mapping is accomplished through the real-time correlations that exist across independent samples.
4. The reentrant maps are activity-dependent such that what we perceive depends in precise time-lock fashion on what we do.
5. There is variability in the system. The variability is anatomical, owing to the high connectivity in the system, and dynamic. The dynamic variability is a result of intrinsic continuous activity in the system (CNS) and the continuous and changing input, which ensures that the system is never in the same state twice (adapted from Thelan and Smith, 1994).

Perceptual categorizations (which are the microcategorizations that form the underpinning of all larger categorizations and conceptualizations) occur when the outputs of multiple maps are coupled with the sensorimotor behavior of the animal through a higher order structure called a global mapping. A global mapping is a dynamic structure containing multiple reentrant local maps (both motor
and sensory) which are able to integrate with nonmapped areas of the brain. Such a global mapping ensures the creation of a dynamic loop that continually matches animals' gestures and posture to the independent sampling of several kinds of sensory signals. And, of course, categorization always occurs in reference to internal criteria of value. What I want to emphasize in all of this, however, is the requirement of action for the establishment of new categories.

Developmental semiotics, and how this is expressed in infant development, is the last field relevant to the concerns addressed in this essay. Much of what I review here has been developed by John Muller (1996) who argues that an infant's subjectivity emerges from intersubjectivity. He argues that subjectivity is intimately related to semiotic empowerment, or the ability to conduct a dialogue with another sign-using individual, and this ability first emerges out of the rhythms of touching, gazing, and vocalizing which occur between caretaker and infant. In other words, the ability to use signs first emerges out of an interaction.

I do not pretend to be the master of the huge topic of semiotics. Keeping in mind my thesis, however, that action is a necessary component of new learning, that is, the observations that the ability to use signs emerges out of interactive processes which are originally hardwired in the infant appears highly relevant. Through reading his caregiver's signs, the infant develops protolinguistic concepts. Semiotics is the study of signs and symbols. De Saussure (1959) defined a sign as something that stands for something else to someone. That which represents is called the signifier; that which is represented is called the signified. (See Litowitz, 1991, for an overview on linguistics for psychoanalysts.) Peirce (1992) expanded de Saussure's work by emphasizing that signs are not static equivalents but are the result of an interpretation. He introduced the notion of an interpretant by which he meant the idea to which a sign gives rise (Eco, 1976). The notion of interpretant is crucial, for it is this that provides the eventual link between culture and the individual.

There are three types of signs: the icon, the index, and the symbol. The icon is that which represents the object by resembling the object. Thus a statue of Marilyn Monroe is an icon of Marilyn Monroe. An index is representation through some connection with the object, for example, the physical effect of the object. Marilyn Monroe on the door to the ladies' room indicates that women can use this bathroom. Finally, a symbol is representation by being so understood or by convention. A statue of Marilyn Monroe could also function as a symbol for feminine sexuality.

It turns out that there is a developmental line for sign formation that follows a path from the use of icon, or what is known as enacted iconicity, to the use of indices to the use of symbols. For the infant, the earliest semiotic participation is through enacted iconicity. This is the induced mirroring effect seen in very young infants in which an expression in a caregiver—such a smile—induces an involuntary mirroring expression in the infant (Meltzoff and Moore, 1977; Field et al., 1982; Haviland and Lelmica, 1987). A gaze from the mother induces a raptly
responsive gaze from the infant and vice versa. Muller (1996) examines the responsive gaze as it develops through enacted iconicity through its function as an index representing the contiguous presence of the other, to its use as a symbol with its own meanings or interpretant.

One does not have to be conscious of the interpretant (i.e., one does not have to be conscious of the actions, feelings, or ideas evoked by the sign) for it to have an effect on one. Peirce (1992) himself distinguished between interpreters that are feelings (emotional), those that are actions (energetic), and those that are recurring patterns of idea clusterings (logical). Muller (1996) argues that a basis of the repetition compulsion could lie in coerced, iconic, and enactive mirroring, structured by signs, including, most importantly, the affect state of the other; whole logical interpretants are not available to the subject’s consciousness. His argument for this rests on the concept of a developmental line of the interpretant that parallels the developmental line of the sign. This idea says that developmentally, the first meaning of a sign is the action it generates in the individual. (Remember the involuntary responsive mirroring expression of the infant.) Developmental studies of infant semiosis also hypothesize how human meaning emerges out of intersubjective action. Up until about nine months of age (see Trevarthen, 1989) one can observe so-called primary intersubjectivity, which is the replicative empathy based on mirroring processes of an iconic nature. This is the early, iconic, automatic form of intersubjectivity. After nine months, the infant develops voluntary control over the expression of empathy, but the initial expression is in the form of an involuntary action. Trevarthen observations lend themselves to the idea that it is out of these early interactions that category formation and concept development occurs. Trevarthen concludes that “the uniformity of the basic features of timing (kinematics), anatomic form (physiognomy), and energy of expressions, and their transitions in close engagements is sure evidence that autonomous, self-organizing principles of brain development create matching capacities for intersubjective engagement between infant and caretaker” (p. 698). (See also Beebe et al., 1997; Sander, 1977.)

When the response of the other in these “protoconversations” falls out of timing, the structure of intersubjective recognition collapses. Trauma is a blocking of meaning (Barthes, 1977).

With this introduction, I would like to present a clinical example.

Case History

This is the analytic story of a patient whose lament throughout her analysis, especially as she perceived that I expected our reconstructions of her traumatic past to have therapeutic effects, was “Analysis is paralysis!”

A single woman in her 30s was referred because of her unhappiness about being unable to develop an intimate relationship with a man. Although she was a highly successful professional in the business world, she had never dated, and
certainly never had any kind of relationship, other than friendship, with a man. Her fervent wish was to one day marry, but she knew that she was terrified of men. The patient, Ms. A, had been the middle child of three, with a brother, five years her senior, who she had once worshiped, and a sister, six years her junior, to whom she was deeply attached and toward whom she felt very protective. The disillusionment with her brother had occurred when he became involved with the woman he was to eventually marry. The younger sister, described as feminine from the day she was born, had already made a successful marriage.

Ms. A remained very involved with her parents, and told me that she had the nickname of "the good daughter." This was because she had been outwardly uncritical of them, remained involved with them, and her financial success had allowed her to support them as they needed it. As we reconstructed it over time, Ms. A's father was probably quite depressed when she was little. He has "mellowed" with age, and now she knows that he takes an antidepressant. But the most powerful and formative memories of her childhood were those of living in terror, awaiting his disapproval which was meted out in verbal and physical abuse. To give you the flavor of the father, allow me to repeat the story—which the patient bitterly recalls—of her sister's first day in kindergarten. After school, the sister was to get on a bus to come home. She got confused, and got on the wrong bus. Realizing her error, however, she got off the bus with a friend and went home to that friend's house. The sister asked the friend's mother to call the neighbor to whose house she was supposed to go, but the phone was busy. Eventually the friend's mother drove the sister home, but not before the parents, having checked to see if she had made it to the neighbor's house, had closed their store early and come home in a panic. The father was enraged, and beat the sister for this. He had a special paddle which he used for these beatings.

In another memory, Ms. A recalled being beaten when she refused to give her father the "obligatory" good night kiss. Dinners, when they occurred, were nightmares in which she invariably ended up in tears after her father's interrogations, intimidations, and tirades about the children's disappointing achievements. Tears were a nightly occurrence. Although an aggressive, assertive business woman, the patient's mother was nonetheless depressed, and most of Ms. A's interactions with her mother occurred when she went into her mother's bedroom, where the mother had retreated in depression.

In this atmosphere, the patient made the important (conscious) decision never to show her feelings to anyone. She believed that to the degree that anyone could see how you felt, they could use that against you. Her father, she said, was an expert in this. She was able to be reasonably successful in school, looking to her brother any time she needed academic help, especially because turning to her father never failed to reduce her to tears over her inadequacies.

Her major success, and profound sense of mastery, came through athletics. She was a talented athlete, and earned her place playing football with the boys in her classes. In high school and college, she competed at a very high level in state
competitions, and became the first woman to win varsity letters on the men’s basketball and tennis teams. She became the protégé to a famous female athlete in her field until an injury sidelined her. Her father never showed any interest in her athletic success, and came to no events except for one high school basketball game. This was not her primary event, but it was significant that during the only game that her father ever attended (during the only time he ever watched her compete), she injured herself.

Although Ms. A could compete with the men (and she did so in her profession as well), she was unable to engage them in any kind of intimate relationship. She felt such danger of being violated should she reveal her emotions that no intimacy was possible. She had a masculine look to her, a kind of swagger that one sees in certain athletic women. Even though she primarily wore skirts which showed off what she felt to be her best feature, her legs, there was nothing about her that was flirty or sexy. Indeed, she was deeply ashamed, even resentful, of her well-endowed body. Ms. A’s sexual life was one of terror. She had no feeling of attraction toward men, and equally clearly no feeling of attraction toward women. She had been mistaken for a lesbian, but this seemed to be a misunderstanding of her asexuality.

We got along very well, very quickly. She formed a very positive transference to me, idealizing me, and feeling appreciated by me. I was wowed by her athletic abilities, and her ability to survive what I perceived to have been a crippling childhood. And so things went well in her analysis. On occasion, however, the cry arose “analysis is paralysis,” but for the most part, she “put me on a pedestal,” as we gradually explored and reconstructed the painful nature of her childhood and how this interfered with being able to be open to overtures from men. During this time she recounted an incident with a therapist she had seen while in college. She had developed romantic feelings toward him, lost a lot of weight, enjoyed her body for the first time. He fell in love with her as well, took her out for dinner and kissed her. This was so traumatic and confusing for her that she quit therapy, yet felt that it was her own inadequacy that had led to failure. Our work together led her to feel that her love had been exploited, repeating crucial transactions with her father.

Suffice it to say, things went along well, and we were operating with a defense transference. I could not fail. As would be anticipated, she soon enough reached the point where extratransference analytic work had accomplished as much as it could, and the crucial interactions came to be replayed in the consulting room. It is the following dynamic that I want to look at closely and to think about from a more operational point of view.

Ms. A had struggled with a mortification about feeling dependent on me. It was apparent to her that she felt I was her hope, her life source, her courage, and talking with me always had an enlivening effect. She would end sessions with the comment, “It’s been real.” Gradually, however, Ms. A was beginning to feel disappointment that despite talking with me, she felt “blah.” Nothing was chang-
ing in her outside life. What difference did it make that she understood why she felt terror in the presence of men. She knew that she had been traumatized by a father she had trusted, feared the repetition of that, and believed she would be hurt in a relationship. I turned myself into a pretzel trying to talk about how hurt was inevitable in any relationship; the challenge was being able to survive the hurt, use it as meaningful information, grow from it, and even achieve a deeper connection to someone through this. That was psychobabble to her, because, for her, everything stopped at the hurt. I want to return to how I understand that later. At the time, I had the repeated thought that she was experiencing some kind of de-idealization of me, and I suspected that that reflected a natural, nontraumatic process of “optimal disillusionment.” I interpreted her disappointment with me often. There were countless sessions in which I felt we were really making headway understanding things and accruing psychic structure.

But overall her view of me seemed to be becoming blacker and blacker. I had moments of sensing that she experienced me as an evil monster, and in every session, something I said, something in my tone of voice, something I forgot to say led to her feeling deeply wounded. I hope you will accept my summary that I tried every possible approach I could think of. I tried to accept her hurt as valid and live through the experience with her; I tried to identify and acknowledge ways in which I had hurt her; I interpreted the enactment with roles reversed such that I was in the role of the child in which there was no chance to make reparations or to alter the situation; I interpreted the transference and the fear of repetition of trauma; I explored the possibility of fear that should she not see me as abusive, it catapulted her into a maternal transference and depression which was even blacker (negative engagement is preferable to no engagement); I explored whether the negative experience disguised the longed for, yet potentially traumatic loving attachment; I considered her need to maintain her autonomy in opposition to me such that every empathic comment threatened her autonomy; I tried to wait it out. But she didn’t let me. Instead I seemed to be more and more cast in the role of the abusive, intolerant father, and she would voice her fears of saying anything at all to me because I would focus on what was wrong with her. When she came to sessions looking as if she had been weeping, sounding extremely depressed, any comment that seemed to acknowledge that state felt like a “low blow” to her, and she became accusatory and critical of me. When she insisted that going over the past was useless—analysis is paralysis—and irrelevant and I would therefore attempt to remain focused on her immediate experience, she chastised me for abandoning my principles (because I had maintained that it was essential to try to integrate past experiences), and concluded I couldn’t be trusted. Because I had never “recanted” on anything in the past, how could she assess what my acceptance of her need to stay in the present meant?

One session began in an apparently friendly manner with Ms. A talking about general topics from work and so forth. With seeming innocence, she essentially asked me why I had lied to her. The lie concerned her knowledge of me as a
person. She believed that I had told her that my father was not a physician. (It was my recollection that I had not responded to that inquiry at all, but that she had been curious about it in the context of exploring her own relationship with her own father and her wondering if I had had a father with whom I could identify.) The exploration of her sensitivity to my issues, and how this evolved, is, to me, a fascinating topic which could be explored in another context. However, what evolved at this moment was that she recalled standing at the door to my office, as the session was ending, and asking me directly if my father was a physician. I allegedly told her “no,” yet it had become clear to her from something I had said recently that indeed he was a physician. For her, the crux was that she had proof that I had lied.

I felt her wording was a bit strong. I responded by expressing curiosity about the fact that she felt I had lied to her. To her there was nothing to be curious about. She had proof that I could not be trusted, and she escalated her distress. I responded by saying that she was deeply afraid that I could not be trusted, and that she was afraid that if she felt pulled to trusting me, she would be traumatized as she had been in the past. I also said that it must be a terrible feeling believing that I would lie to her. But to her the issue was the truth of my lie. I explored again what she thought had happened, and said that I really didn’t recall her asking me the question, and I certainly couldn’t imagine why I would outright lie to her about that. I suggested that perhaps I hadn’t even heard the question at the door. Besides inciting her anger with me that I could have been inattentive, this was unacceptable because it was clear to her that I had lied. She knew what she heard.

She was so convinced of this, and I felt the accusation to be so damaging to our ability to work together, that I decided I needed to find a way to alert her to this. I said, “I am really distressed that this is how you are interpreting what happened. We need to pay attention to why this is happening.” But her need to cling to her reality became that much more tenacious, and the alliance was about destroyed. My final effort was the following: With a lot of affect, I said that this was “outrageous” that she would accuse me of something so appalling. To even think that I would lie to her and not consider that some kind of misunderstanding had occurred was abusive to me, and she needed to think twice before she made such a devastating accusation!

I was walking a thin line here. She is a trauma victim, and the mere fact of my yelling at her (because this is how she experienced my intensity), was retraumatization. But at the same time, this was a nonverbal enactment of the trauma inflicted on her by her father, but with the roles reversed. And in this enactment, it seemed to me that I, as the victim, had to demonstrate the affect to which she, as a child, could never give voice.

Some psychoanalysts would worry now that the patient would bury this aspect of herself and make it forever inaccessible to treatment, in the service of preserving the relationship with me. But I don’t think that this is what happened.
As far as I have been able to determine, there were two processes occurring simultaneously. One was the articulation of her previously never articulated affects via the enactment in which our roles were reversed. The groundwork had been laid for this over the years of analysis, and she actually could grasp and appreciate my willingness to engage with her at this level. But the traumatic nature of my increased intensity was almost insurmountable. In fact a dream depicted her experience. In the dream she was going through a revolving door. Her purse is stolen, and while the speech she had prepared was still in her purse, her other valuables had been stolen. In other words, analysis (she had words) was paralysis (no life), and the life-sustaining engagement with me had been taken from her. She absolutely understood, at one level, that it was right to protest if accused unfairly. But she stood firm in saying that my yelling existed without context. That once I raised my voice, I was her father and all hope (for a sustaining milieu) was lost.

Different schools of psychoanalytic thought would assess this moment in a variety of ways, but generally they would agree on the phenomenon of a collapse of the patient’s flexibility. At the moment of my intensity, the patient lost any ability to reflect on her experience (see Gehrie, 1993; Barry, 1998). On the one hand, the fact that I was pulled into an enactment, or a projective identification, in which I replicated the father’s abuse seemed to reflect a powerful initiative on the part of the patient to integrate the traumatic experiences. If one breaks down the sequence, it follows that the patient’s insistence on her attribution of meaning to a situation was meaningful to her in that it negated mine (all of my attempts to accept and be empathic with her meaning were rejected), and the negation produced a powerful affective protest from me, the affect of which set in motion a second series of events. This is what Modell (1990) would speak of as the “iconic transference” or what Muller (1996) would describe as follows: “The feeling interpretant [the negation of my subjectivity] brings about a coerced affective mirroring [her abuse induced my abuse echoing the father’s abuse] of the past, bearing a resemblance to the past, a resemblance not usually perceived by the other member of the dyad, and rarely by the one acting, who is blind to the action’s meaning or to its status as a repetitive icon” (p. 190).

I came to understand the traumatic nature of her father’s yelling as precisely the fact that at the moment when her father yelled, all exchange ceased. (The “protoconversation” fell out of time, and intersubjective recognition collapsed.) The rules of engagement were that she must remain silent and implicitly accept her father’s assessment of the situation. All semiotic exchange ceased. This was the paralysis. No repair or understanding was possible. There was no “meaning” in yelling; it conveyed nothing that could be used other than as an alarm signal that all activity on the part of my patient must cease. The patient’s actions (including her emotional responses) had no effect on her father’s behavior. There was no opportunity for interactive repair, and nothing could be learned. It was
an end point. From this standpoint, it was understandable that my patient clung to the memory of her hurt. It was accessible to her like a fresh wound, and painful as that was, it was the verification of her abuse.

Following this initial rendition of a (previously warded off through disengagement and/pseudoidéalization) repetition compulsion, a tremendous amount of work ensued, and I sought to maintain engagement and dynamic action in the face of her paralysis. I sought to understand what had happened, examine transference repetitions, and I apologized for having traumatized her (which she accepted but experienced as meaningless) and so on, all in the face of the patient’s repeated expressions of despair that now all had been lost. Ultimately as I truly felt that I had indeed made a therapeutic error too grievous to be overcome, and articulated the manner in which her reaction had made me reassess myself, my therapeutic ambitions, and so on, Ms. A would respond with shock, disbelief that I had actually responded to her, and profound gratitude that I would fight so to preserve our relationship. What I want to make clear, however, is that what was actually exchanged between us went far beyond words alone. The words allow me to structure and express the interaction for you, and had iconic meaning for her, but so much of our exchange depended on gesture, rhythm, vocal tone, and affective exchange, all of which began to become more predictable and occur within a shorter time duration as our dance repeated itself over and over.

Although the example I gave was the most dramatic episode, there were many which followed, all having (on retrospective analysis) very similar patterns. The patient would complain about some aspect of my behavior, usually something that I said that hurt her. I would empathize with the hurt. One way or another she would let me know that nothing I could say would make any difference. I would empathize with that state, and her feeling of despair. She would escalate to finally accusing me of something I could not tolerate being accused of—whether it was lying, in the first instance, or being intentionally cruel in another instance, or what ever milder variation on this very troubling theme. At the point that she accused me of some intolerable crime, I would lose all hope. I would experience myself as withdrawing, and I would say something to this effect: That if she could indeed only see things in this way, then we had reached an impasse in our work together (I no longer needed to even raise my voice), and I even went so far as to suggest that she obtain a consultation. At this point she would then begin to repair the damage, and, with increasing ease, begin to examine her own difficulty in being able to accept me as less than omnipotent or herself as more than impotent. Invariably the exchange between us would lead to her asking me how I had changed as a result of our exchanges, and I would answer, genuinely, whether it was the fact that I had to reassess my getting angry too quickly, or whether I had to confront a rationalization about my reasons for doing X or Y. She would then look, sound, and experience herself as stunned to imagine that I
could/would be changed by our interaction, that her actions impacted on me. And then she would produce a dream. In two instances, the dreams had to do with the modification of grandiosity—the modified character could reflect either herself or her image of me, but they were hopeful dreams.

Modell (1990) suggests that we consider affect to be the motoric component of perception in the analytic situation. He suggests that affect operates to form the link between the present and the past, and I agree with his suggestions. Certainly with my patient, her affective engagement was crucial for new learning to occur. I would like to suggest that it is possible to think about the interactional elements of what is exchanged in the analytic process as components which allow new categories to be formed, or fragilely held categories to be expanded, and new ways of conceptualizing experience to emerge. The choreography of the exchange between my patient and myself—her (active) perception of my affective responses to her—was a genuinely new experience for Ms. A, and she came to be able to generalize this to other relationships such that true intimacy became, for the first time, a possibility.

Two phenomena stand out in this case example. The first is the enactment with its iconic aspects replicating the crucial interactions between the patient and her father. The enactment was played out in a nonverbal mode (not surprisingly it was precisely her treating me in the accusatory, rigid manner that she attributes in memory to her father, which elicited my affective response, the iconic enactment of the abuse) and established a previously determined and rigidly maintained affective category. The second is the work/new learning that occurred after the iconic enactment, which contained its own enactive, motoric, mirroring aspects, reflecting new learning, the formation of psychological tools through new category formation, and the possibility for intersubjectivity. Ms. A’s response to my affect—on those occasions in which she “opened her heart” to me—was to be “shell-shocked,” unable to speak, unable to process information, in my words, disorganized. But she had lacked the ability to evaluate the meaning of the exchange long before the moment in which she became shell-shocked. After many of our learning exchanges, she was able to say to me that she knew that I would get angry with her again, but that she also knew that she would yell at me. My hope, of course, is that one day she will be able to tell me that she is feeling angry, and be able to reflect on that emotion and its precipitants.

In the interaction in the past, neither father nor patient could give symbolic meaning to the interaction. To put this in Muller’s (1996) terms, semiosis was blocked in that semiosis is intrinsically dialogic as the interpretants of our signs are transformed by the feelings, actions, and thoughts of others, that is, by the subjectivity of others. The impact of the patient’s treatment of me was to elicit a “feeling interpretant/a dynamic interpretant.” As Muller notes,

[T]he feeling interpretant is the sign’s initial impact on the sign’s receiver [I felt attacked, mistreated, outraged], an impact that is in the form of coerced
mirroring. This initial impact may be subliminal and directly lead to action [I protested and thus defended myself, through use of my body language and gestures, and affective communication, along with the use of words, but probably more as indices—like STOP—than as symbolic communications]. . . . Such action constitutes the sign’s dynamic interpretant, the sign’s actualized pragmatic meaning. The abstract meaning of the sign, its logical interpretant, a generalization requiring the use of verbal symbols, is a further development of semiosis in a hierarchy of iconic, enactive, and symbolic communication [p. 191]

Whereas semiosis had been blocked in the transactions with her father, my efforts were directed at opening up the dialogic process. Thus after I raised my voice, and my patient felt shell-shocked, it was my emotional response—my genuine remorse—that the patient came to feel was transformative. I understand this as her recognizing that I was transformed by her reaction, but processing this first only at the level of protolinguistic new category formation.

Defining new category formation at this level is difficult, and one runs the risk of taking unwarranted liberties with a theory. It is certainly a long jump from Edelman’s (1992) categorization couples to recategorization of an affective state. Nonetheless, it seems useful to conjecture how new categories and concepts come about. Could it be that the patient’s acting to generate an emotional response from me, which she then registered in real-time, allowed new affective (and eventually emotional) categories to be formed?

Both Edelman’s theory of categorization (at the most elemental level) and cognitive science’s theory are theories in which the subject’s action is a necessary requirement to develop categories. The patient’s affective responses, which accompanied the enactive communications, as well as her observations of my affective responses to her using all her senses in an increasingly ritualized manner, constituted the action portion of new learning, new category formation, and ultimately semiotic empowerment. In the long run, psychoanalysis can set you free.

References
Interactive and Self-Organizing Aspects of Learning

As a psychoanalyst contemplating Edelman’s (1992) model of the mind/brain, I have felt quite excited about the possibilities it suggests for our field. There is a cost for everything, even for good ideas, and before I go further, I want to point out some of the old and cherished beliefs and presumptions we will be prompted to reexamine, clarify, reaffirm, or perhaps relinquish as we consider Dr. Edelman’s model.

There are some presuppositional differences between Edelman’s mind/brain model and most psychoanalytic models, some of which I discuss here, focusing on three: the nature of evidence or data, the unified mind/brain, and the nature of change.

1. Most immediately striking is that Edelman’s definition of evidence for ideas about the theory of the mind is that it is objective and empirically observable, like for all natural science. This is unlike the evidence in clinical psychoanalysis, which is empathic observation of subjective states that does not meet the criteria of reliability and validity.

2. A second tenet of Edelman’s mind/brain model is that mind and brain are unified as one, with the psychological mind being rooted in the biological brain processes. Many psychoanalysts would not agree, and instead they would assume that biology and psychology are separate but somehow reflect one another. This has supported a belief for many psychoanalysts that biology can be safely ignored, except in life-threatening circumstances or for very sick patients where psychopharmacology can be helpful. Among
another smaller number of psychoanalysts, a reductionist position has been held, when the biological brain processes are considered shadows of the mind’s organization.

3. In Edelman’s mind/brain model, developmental change in the life span and the reorganizational change that results from therapeutic intervention are not the same process. Most psychoanalysts do not make this distinction, and in fact would argue that successful therapeutic intervention reengages development. From a biological view, developmental change results from the interaction of genetic potentials and environmental opportunities, whereas therapeutic change is initiated only by interactions with the environmental context.

I discuss how psychoanalysis has differed from Edelman’s model of mind/brain for each of these points, and in the last half of the essay I make some points about consciousness from a psychoanalytic view, using case material to illustrate phenomena which are well known to psychoanalysts. I hope to make some observations about the vicissitudes in the shifts and dissociations of higher order consciousness which might be usefully considered by psychoanalysts as the basis for a dynamic systems natural science of the psychoanalytic process.

For Freud and still now for many analysts, consciousness is the result of perception by the “eye of consciousness” (cf. Solms, 1997). Consciousness relies on an “eye,” which is sometimes thought of as an homunculus or as an organ and specific function in the brain. For psychoanalysis, the Conscious is a container of information that can be banished to another container, the Unconscious, and then again be returned to the Conscious. This is the model that is behind the psychoanalysts’ concepts such as repression, disavowal, and other defenses. Instead, for Edelman, consciousness is a spontaneous product of the biologically rooted complex mind/brain organization, a result of a process involving multiple responses and connections throughout the brain that are influenced by the person’s interaction with that person’s immediate and past environmental context. For Edelman, consciousness, and with it the potential for self-reflection, can constantly change with the context and the ongoing reorganization of the mind/brain. I believe this view of consciousness can support and extend new ideas about the psychoanalytic process.

Differences Between Edelman’s Mind/Brain Model and Psychoanalysis

Nature of Evidence in Neuroscience and in Psychoanalysis

Ever since 1895 when Freud chose the psychoneuroses over the traumatic neuroses to inspire his theory-making, psychoanalysis has taken the organization of fantasies in the patient’s subjective experience to be the evidence that reveals
the morphology of the mind. For some psychoanalysts of today, it is still assumed that the morphology of the brain is parallel to that of the mind. Solms's recent essay (1997) exemplifies of this way of thinking, as does the work of Bucci (1997). The psychoneuroses for Freud were the product of fantasy life in the mind, whereas the traumatic neuroses (or actual neuroses) were rooted in a brain-based biological response to having been overstimulated and its subsequent repetition and elaboration in fantasy. As clinicians specializing in treating the psychoneuroses, we have been taught to follow the patient's associations as a guide to the organization of his mind, as the "royal road to the unconscious." Investigations and considerations about the biology of the mind/brain have been put on a back burner, where Freud put the actual neuroses which were thought be caused by biological trauma of overstimulation. Since then, although there has been lip service given to biology's influence, most of us were taught the dualist position. In this view, biology is vaguely parallel to but separate from psychological organization as revealed by associations, dreams, parapraxes, and so forth. The influence of biology is sometimes attributed to constitution, as in the complementary series, or otherwise to inherited unconscious fantasies. Most usually the understanding of biology has been given over to the purview of other disciplines and not thought to be particularly relevant except in cases of sicker nonneurotic patients who might need pharmacologic intervention. In this way of thinking, evidence directly from biology has not been important for psychoanalysis.

Freud believed that the basic structure of the neurotic mind was set by biologically inherited fantasies in the unconscious that were originally formed by the requirements imposed by civilization on mankind's unruly nature. With his Lamarckian and incorrect view of evolution, all members of the species inherited the same troublesome unruly wishes and fantasies. Counteracting the expression of these unconscious wishes were civilization's pressure on the developing child to conform to the rules and expectations of the culture. The restraints of civilization were uniform across all times and all cultures and effected all human experiences. Early mankind's survival was contingent on acquired or learned behavior that could ensure his adaptation to the opportunities and constraints of the cultural environment. Examples of such acquired and then inherited characteristics are the admiration and competition with the father and the oedipal taboo concerning sexual intercourse with the mother. For Freud (1913, 1930) these learned beliefs and taboos eventually became the inherited species characteristics that took the form of universal unconscious fantasies and stages of development common to all people. These inherited fantasies and conflicts were thought to be inevitable and unchanging throughout the individual's lifetime.

The inherited unconscious fantasies in their interaction with cultural restraints were thought to direct the developmental change of the child's mind. In conjunction with idiosyncratic environmental influences that could modify their
expression, these fantasies and wishes were responsible for the final form of the child's development and for his inevitable neurosis. Evidence for these universal unconscious fantasies and how they are distorted was to be found in the stream of associations, dreams, and other spontaneous behavior of the neurotic patient. These observations were thought by many psychoanalysts after Freud (Hartmann, 1939) to be potentially objectifiable as (natural) scientific evidence of the mind's organization.

In earlier psychoanalytic models, therapeutic change was brought about by the unconscious fantasies becoming conscious, or the strengthening of the ego, making them available for new understandings in the light of a new psychic reality. Insight was the outcome of successful interpretations in treatment. The mind as a container of universal, timeless, and unchanging unconscious fantasies was improved because distortions of universal inherited unconscious fantasies were reexamined. These distortions were due to unfortunate and idiosyncratic influences of the person's earlier life experience. The expanding of consciousness reduced the potency of unconscious fantasies, and redirected their expression.

Many contemporary psychoanalysts disagree with aspects of this historically early view, although they agree that evidence for theory and technique is found in complex subjective states and experiences of mind. Their data are to be found in the patient's and their own subjective experiences. Subjectivity of another person can only be known through empathic observation. One's own subjectivity can be observed only by introspection. Neither of these observational methods of the clinical setting could meet the qualifications of natural science observation and methods because reliability and validity cannot be assured with only one observer's judgments. In this sense our clinical investigative work is very different from the biologist's, who starts with a natural science method that privileges the data of objective observations. Psychoanalysts have reacted to their differences from natural science with a sense that psychoanalytic evidence and methods can never be scientifically objective. Some, I think incorrectly (e.g., relationists and intersubjectivists), dismiss the importance of the biological brain and believe that the objective and scientific findings about the brain have no application to their work. Other psychoanalysts, I think incorrectly as well, imagine our field can be transformed into natural science if subjective observations are left aside and instead we move to observations congruent with cognitive science, neuroscience, or other "hard science." An example of this approach is seen in the work of Spence and his colleagues (Spence, Mayes, and Dahl, 1994) analyzing transcripts of audiotaped analytic sessions for the patient's pronoun use as an expression of the salience of transference at that time. This approach claims to "ground" the clinical perceptions of the psychoanalyst in "objective truth" (Strenger, 1991).

Perhaps the way out of this dilemma is for psychoanalysts to agree that their clinical work is not based on natural science, yet not give up the search for systematic ways to observe and describe subjectivity as evidence against which
to test our clinical theory. Edelman’s biology-based model of the mind/brain will of course not allow us easy solutions for our disarray. However, his biological model demonstrates a dynamic systems model which could be useful for psychoanalysis. His model includes biology, subjective experience, and the multiple forces of environment and context as key elements which interact to produce the continually reorganizing functions of the mind/brain. A model for the psychoanalytic process would also include both biology and subjective experience, along with contextual factors such as the analyst’s style and specific responses and interventions.

Mind/Brain Dualism

Edelman would have us accept his premise that the mind and brain are both anchored in biology, thus ridding ourselves of a mind/body dualism (1989, p. 213). Mind and brain are not “separate but equal,” nor are they separate with one being a mere reflection of the other. Rather they are mental and biological manifestations of the same biological process of multifaceted and multilayered interactions. Clinical intervention with our patients is guided by the pragmatics of our doing what works to encourage change, because we know little from natural science about our patients’ emotional disorders. Intervention in psychoanalysis usually is not directed by biological knowledge and theory, but is conceived to be informed exclusively by intuition about psychological experience. In psychoanalytic treatment, we are focused on the patient’s subjectivity, as it can be examined as part of the experiences in the interaction and transference between patient and analyst. Even so, Edelman’s model challenges us: Can we be psychologists and still consider the biological as overarching and primary?

Very little of the mental and the subjective can be observed by objective natural science methods. The brain is studied by methods of natural science, and the mind is studied by the clinical psychoanalytic method of empathic and introspective observation. Therefore our understanding of the mind and the brain do require two separate domains of evidence and investigation. Evidence from these separate investigative domains may only come together in the model we use to think about our work, a model which, like Edelman’s, can be applied to psychoanalysis, as well as biology.

Integrating the biological and the psychological domains with a unified dynamic systems mind/brain model is not a trivial alteration in our thinking. It is more difficult than it seems at first glance, and it is important because our models and theories have far-ranging impact on our analytic judgment. To take one example, adopting a unified mind/brain model can profoundly affect our thinking about clinical anxiety.

A dualist mind versus brain perspective on anxiety as promulgated by Freud would have us accept two types of anxiety as having different sources. Signal anxiety derives from psychological conflict, and primary anxiety derives from
trauma felt on some vaguely defined biological level. Edelman’s model challenges this duality. This model posits many levels of connectivity within neuronal networks, and the Theory of Neuronal Group Connections underscores the essential simultaneity of parallel signaling at all levels of organization in the mind/brain. For instance, the signal anxiety that is the subject of self-reflective work in higher order consciousness can be connected and be parallel to primary anxiety that is more reflexively reactive and perhaps more rooted in primary consciousness. If one wishes to retain the distinction in subjective experience between these types of anxiety, they will be understood as equally biological but perhaps activated differently. They also might be different in what can most immediately influence them to change and reorganize. However, any interaction (or therapeutic intervention) that stimulates reorganization on one level will also influence reorganization on other levels as well, because the mind/brain is an integrated system.

Reorganization occurs within the multiple levels of the neural network substrate, as well as in the multiple levels of meaning, experience, and behavior associated with neural substrate processes. Effective intervention can be of many kinds: (1) psychoanalytic therapeutic interpretation that is accomplished in the context of transference and utilizes verbalizable and otherwise communicable semiotic and semantic meanings; (2) psychoanalytic therapeutic enactment that utilizes behaviorally based new experiences (e.g., Shane, Shane, and Gale, 1997; Renik, 1996); (3) nonpsychoanalytic behavior and cognitive therapies; or (4) a nonpsychoanalytic psychopharmacologic intervention that is designed to alter brain chemistry. According to Edelman’s model, interventions directed to either mind or brain have a potential to influence the functioning of the brain. For patients like ours, however, we have learned that lasting reorganization occurs most dependably when directed to the conscious self-reflective mind and when it includes a communication focusing on transference. The articulation into a verbal narrative about self-observed mutual subjectivity, that is, the transference, will widen the intervention’s impact across multiple levels of meaning, experience, and behavior. In the terms of Edelman’s model, the transference narrative will affect many more levels of the neural network substrate than interventions directed other ways.

Therapeutic Change: Development or Reorganization?

A distinction is made in Edelman’s model between the resumption of derailed development and the instigation of reorganization that permits more plasticity and adaptive flexibility. In psychoanalysis, not making this distinction has created uncertainty and confusion about how to understand therapeutic change and has muddied our debate as to whether the analytic relationship is the same or different from a child–parent relationship. In Edelman’s model, “development”
is always reorganization but a great deal of reorganization is not development. The term development is reserved for linear and predictable reorganizations that are robust across many individuals in many varying environmental contexts.

Among Edelman’s colleagues, there is lively difference of opinions about development. Esther Thelen, a developmental psychologist who has used her work to refine and extend Edelman’s model, proposes a broad definition of development. Based on her experimental observations of children learning to walk, development and reorganization seem to be the same thing, both understood within a dynamic systems and hence nonlinear perspective: “Development ... can be envisioned as a changing landscape of preferred, but not obligatory, behavioral states with varying degrees of stability and instability, rather than as a prescribed series of structurally invariant stages leading to progressive improvement. Although some behavioral preferences are so stable that they take on the quality of a developmental stage, the stability is a function of the organism-in-context, not a set of prior instructions” (Thelen and Smith, 1994, p. 81). Here, Thelen is speaking of development as the self-organization (self is referring to the system, not the psychoanalytic “self”) that occurs with the interaction of the system/organism/person with other people and the environment. Development may appear to be linear, but only because the constraints and opportunities of the environment and context are linear. Therefore, in her view, there is no “universal” or general course, and only developmental pathways as manifested by specific individuals can be studied. For Thelen, the exact course of development and change for an individual is unpredictable, and the distinction between them is blurred.

Biologist Evan Balaban (1998) has a somewhat different point of view about development, which ensues from his commitment to studying genetic influences. He has a particular interest in innate and acquired values. In Edelman’s model, the definition of value is a salience or attraction that directs response. For instance, innate values might be the newborn’s response-preference for light, a craving for food and water, and for tactile contact. Innate values are inherited, the result of having been naturally selected. Innate values can be universals for the species, and are likely to be adaptive for survival. Through the process of associative learning, new values can be conflated with the original innate values, resulting in the emergence of acquired values. Acquired values can be much more complex. For example, they can include subjective meanings, and they can be maladaptive and responsible for intransigent psychopathology, including primary anxiety and character disorders. Balaban’s notion of development, informed by his experimental work with cross-species transplanting of fetal tissue, rests on an interpretation of his findings that some part of a behavioral pattern is innate (the chick call) and some other part is acquired (the accompanying head movement). In his work he demonstrates the chick call is the developmental consequence of an innate value because it is expressed the same
regardless of context, in this case the surrounding host tissue. The accompanying head movement, however, varies according to the species host tissue surrounding the implant and is motivated by an acquired value that emerged in association with the inherited invariant value expressed by call. For Balaban, development is directed by universal inherited values that have been selected, having effects that might be expressed later in life, as well as during the earliest period of life. These universal characteristics are linear consequences of genetic forces, and these universals (genotypes) are influenced in their individual developmental expression (phenotype) by their context. This context will include factors that range from the surrounding biological tissue to the social and cultural surroundings of the organism or person. Changes in phenotype expression over the individual’s life span are understood in terms of nonlinear complex systems, and hence are nonlinear and unpredictable.

From this view, change in development is directed by inherited species-specific genetic factors and has a necessary linear component, with timing and direction being predictable. Other kinds of changes are due to reorganization that is based on acquired values. This other change is nonlinear and not predictable because it is given a direction by self-organizational processes that do not rely on genetic selection process. He would believe the only responses that can legitimately be called “developmental” are those that are based on species-universal genetic values which, of course, in everyday life outside the laboratory are expressed in ways that could be influenced by contextual and environmental interactions. Theoretically, development and reorganizational change are distinguished, but in any particular case, the distinction between the developmental and the reorganizational may not be possible to make. All development (directed by universal genetic and epigenetic forces) usually takes place in the nonuniversal and highly specific context of the individual’s life; the variability of context makes its course and expression unique and subject to the complexities of dynamic systems.

Obviously these ideas about development versus reorganization do not settle the issue for psychoanalysis, but they can sharpen discussions on this topic. It is important for us to realize the specificity and predictability of developmental change, and that the changes we see in our patients are not predictable and specific, and therefore will frustrate our attempts to generalize about the course and outcome of treatment. Therapeutic change in psychoanalysis will be complex. It cannot be expected to be linear and predictable, and is not best understood as “getting the patient back on the track.” Nor can it be understood as “filling up deficiencies,” which would imply that there is an optimal, sufficient, or ideal form and outcome that gets more closely approximated (e.g., the “healthy” or “normal” adult). Instead, therapeutic change is expected to be self-organizing, and not predictable in its direction and final form. Many things will influence its course and outcome, some of which are unintended or nonobvious effects of the psychoanalytic treatment.
At the very least, we must see that there are no easy answers, and that perhaps the best guide for deciding if something is developmental or a reorganization is to apply the criterion for the developmental, that it must have stability across individuals and across social-cultural contexts. Reorganizational change, on the other hand, will be idiosyncratic to a particular individual in a specific context, and will be unpredictable. An example of a psychoanalytic developmental theory that mistakes reorganization for universal development is Erikson’s (1950) theory of epigenetic developmental tasks. This theory set out an invariant sequence in the life span. Erikson lacked an historical perspective on his own time and culture that led him to error in mistaking acquired for innate values. In retrospect it is possible that his “normal and universal stages” were given an appearance of universality by his perception of regularities within the culture of the time, and not by demonstrated universal determinants within the individuals. R. A. Spitz (1946) was another important figure who introduced developmental perspectives to psychoanalysts. However, like Erikson, he believed that critical periods in embryological development are similar to psychological phenomena in childhood and even adult development. Neither Erikson nor Spitz distinguished between development and reorganization. Their error suggests that the most accurate view of change, whether in the life span or in treatment, is as reorganization with outcomes that are not universal, linear, and predictable.

In summary, the three areas of differences between Edelman’s model and psychoanalysis deserve careful thought and consideration. The first difference is about the nature of evidence. I suggest that it is not possible for psychoanalysis to give up subjectivity as evidence, but that this does not preclude the possibility for a natural science study of change in the psychoanalytic process. Evidence from a natural science study of psychoanalytic process and from change processes of neurobiology can be put together in a dynamic systems model to advance our understanding. The second difference is dualism versus a unified mind/brain that rests on a foundation of biological science. I believe it will not be a problem for modern psychoanalysis with a dynamic systems perspective to take Edelman’s unified mind/brain view, and that this can only enhance our understanding of our work. The third difference, regarding definitions of reorganization and development, will stimulate greater clarity in psychoanalysis about the meaning of development and about the limits and possibilities of therapeutic change in psychoanalysis.

How Can Evidence from the Psychoanalytic Process Articulate with Evidence from Developmental and Biological Fields?

A common but unfortunately limited way to integrate evidence from two different fields is through a claim that events in one field of observation cause or correspond with events in the other field. For instance, neurobiologists are now doing cutting-edge research that uses Functional Magnetic Resonance Imaging
(FMRI) methods to demonstrate a correspondence between the occurrence of particular affects or experiences (the experiential field) and specific areas that are activated in the brain (the neurophysiological field). Another example is found in the work of psychoanalyst Howard Shevrin and his colleagues (Shevrin, 1995). His perspective would support the claim, for instance, that a relationship between memory deficiency (cognition) and anxiety (experience), observed in a cognitive psychology paradigm, corresponds to the activation of repression caused by certain anxieties in the psychoanalytic setting. Both these examples require a linear or causal explanation where one set of events corresponds to another. To find these linear and causal connections between events, it is necessary to eliminate as much random complexity as possible. These unexpected, irregular, and often powerful forces comprise “error” and obscure the simple orderliness of one-to-one causality. That’s why, for instance, Shevrin’s observations are made in carefully controlled laboratory conditions. The advantage is that memory function is removed from the usual complexity of its everyday context. The operation of memory can then be seen as a closed system that is predictable, the way an old-fashioned eggbeater whips the batter when it is cranked.

Of course, this very advantage that makes it function predictably is precisely what puts off the practicing clinician; the clinician will object that “it has nothing to do with what really goes on in treatment.” If, however, the practicing clinician does not reject this finding as irrelevant, and instead tries to make use it, the clinician must think of the treatment process and the laboratory observations as parallel. This requires thinking in metaphor, making a story that whatever is observed in the clinical setting is as if it were happening in the laboratory, but arguments will ensue over what criteria are used to privilege one metaphor over another.

Another much more promising approach to finding relationships between evidence from different fields is through constructing a model for the process of change. Edelman has done this in amassing evidence from many biological fields to build his model of the mind/brain. In this approach the focus is on the rules for change, regardless of the specific events that are the evidence observed. The important evidence refers to how change occurs, which is not to pursue the more distant theoretical question of why it happens. The construction of such a model uses data from many types of observational fields where change is studied, and it always involves the observation of complex systems.

What gets observed in this kind of dynamic systems study? When complex systems self-organize, they settle into a fluctuation between two or several modes of behavior. Each mode is a state, which is organized around an attractor. As these ideas are applied to psychoanalysis, this attractor can be an experience, for instance, of pain or safety or whatever else. For self psychologists, they can be understood as self-states that are organized by a particular experience with the
selfobject. In psychoanalytic treatment, this internal experience of the selfobject gradually becomes part of the transference to the analyst. The self-state that accompanies each particular selfobject experience might be introspectively observed and reported for some patients, but for many more of our patients, where intense anxiety accompanies the particular selfobject experience, that self-state is split off and observed in transference enactments.

Complex systems are open, that is, they are always impacted by multiple forces from outside, from its context. Complex systems are also unstable, not like the eggbeater that moves the batter in a predictable pattern. For Edelman, the brain is a complex system that is open to all kinds of influences from the rest of the body and the physical and social environment of the organism. The brain is also unstable, constantly shifting from one state to another in patterns of change that are not predictable from its initial state. These patterns of change, and things like what sets off shifts in these patterns, are the focus of investigation. Findings from this kind of study are useful for constructing a model for the functioning of dynamic systems. This model not can be used only to understand more about the brain, but also to understand more about other processes of change. Esther Thelen, a developmental psychologist, also uses this model to study behavior as in the development of movement, for example, walking, reaching, and perceiving (Thelen and Smith, 1994).

This dynamic systems model can also be used to study the process of change in psychoanalysis. The search for the rules of change would be the same as that search for Edelman and other biologists who study complex systems (including evolutionary biologists), and it will be the same kind of search that is made by such developmental psychologists as Thelen. The essential relevance of Edelman to psychoanalysis is not what he can say about correspondences between brain function and the patient’s experience; what is relevant is his dynamic systems model for change in the brain, because that model is also applicable to understanding change in the emotional functioning and experience of the patient in the psychoanalytic process.

Constructing a Model for Change in Psychoanalysis

We must acknowledge that not all change in our patients’ psychological functioning is enduring, nor is it necessarily produced by what we believe we are doing in psychoanalytic treatment. Edelman’s dynamic systems model helps explain how there are many kinds of influences on reorganization, including behavioral conditioning and associational learning, and pharmacologic and other biochemical agents. Intervention one place in the system will influence everything else in that system. Having accepted this notion, a psychoanalyst must then go on to specify the unique features of psychoanalytic treatment that differentiate it from other non psychoanalytic psychotherapeutic interventions.
Psychoanalysts agree that one of these unique features is our goal to “expand consciousness” and increase self-reflection. Techniques to accomplish this rely on the analyst’s empathic observation and response to the patient’s subjectivity. Serving as the basis for therapeutic change, this must be tied to the transference as the focus of treatment. “Transference” is the psychoanalyst’s way of seeing coherence and organization in the patient’s subjective experience that accompanies repetitions in his behavior, affect, fantasy, memory, enactments, dreams, and here-and-now experiences with the analyst. Enduring change takes place in the context of the subjective experience of the transference.

This notion of transference can be redescribed in the terms of Edelman’s mind/brain model as follows: Transference is created from memories and perceptual categories rooted in the patient’s past experiences, as well as from present-day interactions with the analyst and with other people and chance opportunities in the patient’s current life. However one thinks of the transference process at any given moment in the treatment, it serves to hold together and integrate the subjective experiences of the patient and the analyst. These subjective experiences are rooted in acquired values which carry the intense salience expressed in the patient’s recurrent patterns in the patient’s subjectivity. These acquired values result in systems of salience that direct the person’s strivings. These strivings are repetitively recognized and reorganized in the construction of a subjectively coherent transference narrative that includes retranscribing memories of the past (Modell, 1993). With conceptual recategorization made possible by the reworking of memories and the articulations of transference experiences, the patterns of acquired values and related strivings will gradually change. This will result in the patient’s reorganization.

Meaningful behavior, articulation in language or semiotically based communication, as well as fantasy, are important for the psychoanalyst. All are “actions” in the sense of being expressions of the person’s mind/brain organization. Many have claimed that the patient’s experience in treatment of that patient’s own actions and mutual enactments with the therapist is curative. Although for some patients this is most certainly true, this type of therapeutic action is not unique to psychoanalysis. However, the unique feature of transference-based psychoanalytic treatment is the verbally or other semiotic but nonverbally communicated narrative that emerges from the back-and-forth of the patient’s reported experiences and “actions” in the analytic setting, for example, enactments and fantasies, in interaction with the “context,” and the analyst who offers empathic recognition by her responses and interpretations. When the narrative is organized, communicated, and thus recognized by the analyst, self-reflective consciousness is expanded, and the acquired values (including unconscious motives) can be revised. This gives the patient an opportunity for reorganizing and changing in a more thoroughgoing way than patients in other forms of psychotherapy. Salience, or acquired values, gives direction to the transference experience. The intense shared experiences and self-reflection during the con-
struction of a transference narrative results in reverberations on many levels of the mind/brain.

Edelman’s ideas about consciousness in a dynamic systems model of mind/brain are pertinent for questions psychoanalyts debate in discussing therapeutic change. Why does change take so long? Why is repetition so prominent a feature? Why are enactments as expressions of meaning important in the treatment process? Why is verbalized interpretation about meanings and commentary and labeling of categories so important? Why is transference central?

Edelman views consciousness as the spontaneous result of human mind/brain self-organizing activity that happens in interaction with its environmental context. For the purposes of our discussion here about psychoanalytic treatment, this context is the analyst as selfobject. Edelman makes a distinction between primary consciousness and higher order consciousness. Primary consciousness is “awareness,” which is made possible through two evolved capacities of the brain: the capacity for perceptual categorization of experience and interaction with the world and memory. Higher order consciousness is awareness of awareness, or self-reflection, made possible by the evolutionary capacity for symbolic and other related nonsymbolic redescriptions of states of awareness (or primary consciousness). Always it requires some kind of shared semiotic or semantic system, usually involving the use of language, which makes possible the socially communicable discourse with self and other or within the self that is essential for the internal dialogue of a self-reflective process.1

There can be many varieties of states in primary (awareness) or higher order consciousness (self-reflective awareness), which altogether comprise the Jamesian “flow” that is our experience. As psychoanalyts with our patients, we are concerned with observing and interacting with this “flow” of primary and higher order conscious states, using it as a data base to infer split-off or unconscious states. Such states reflect the organization of selfhood, and are self-states. One of the objectives for psychoanalytic treatment is to increase or improve the patient’s capacity and use of self-reflection, expanding higher order consciousness to make these states the objects of self-reflection. As self-states, they rely on an “organizer” or, in dynamic systems lingo, an “attractor,” which is a particular selfobject experience which occurs in treatment with the analyst.

For the sake of exploring and extending the usefulness of Edelman’s ideas about consciousness, we can begin by describing familiar psychoanalytic ideas in the terms of his mind/brain model. We can agree with Edelman that (1989, p. 194), generally speaking, “mental diseases” are disturbances in intentionality

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1 The currently popular distinction between procedural and semiotic memory, used to distinguish between levels of experience and functioning in treatment, is not parallel to the distinction made here between primary and higher order consciousness. Procedural memory can become the object of self-reflection of higher order consciousness, just as semiotic memory might not be such an object.
and that they are manifest in states where an original intention or some affect about that intention, that is, a longing, is unconscious and barred from awareness. Another different category of unconscious processes or contents are those that have *never* been in awareness, such as the structures and organization of the mind itself. Psychoanalysis is the study and treatment of dissociation, or the first of the just-mentioned types of unconscious processes, variously designated as repression, disavowal, denial, and myriad forms of splitting. Dissociation can be thought of as *breaks in consciousness* that happen when conscious knowledge is repudiated or for some other reason becomes inaccessible to awareness. The term "breaks in consciousness" emphasizes that higher order consciousness is a *given* in human experience, and explanation is demanded not so much for its existence but for the *breaking of its flow* in regard to adaptive and flexible attention.

With our patients we are nearly always concerned with disturbances in higher order consciousness, or self-reflective awareness. Edelman proposes that the functioning of higher order consciousness rests on three biological evolutionary brain capacities which are the underpinnings of the spontaneous emergence of consciousness in mankind. In addition to the two brain capacities essential for primary consciousness, the *categorizing of percepts and concepts* and *memory*, there is another essential capacity, to construct a *socially communicable narrative*. This narrative may be expressed in a semiotic or semantic terms, but in psychoanalysis it is often verbal language. Each of these capacities are different but coexisting and interrelated levels of organization, correspondent to levels within the neural network. Opportunities for functional change or for new paths and loops of reentry are opened up as increasing interactions among the other levels become possible with the expanding and increased conceptual integration of higher order consciousness.

States of consciousness in the mind vary with dysfunction in any of these three kinds of brain capacities or because of failure in reentry. Failures or distortions in perceptual categorization are rare in psychotherapy patients, and are more often the source of problems for the neurologically impaired. However, dysfunction of concept categorization and of memory recategorization are common sources for problems with our patients, and have been described in this way by Modell (1990, 1993). Another common source of problems for our patients is failure in the socially communicable articulation of experience that supports and is correspondent to the reentry pathways that make recategorization and integration possible. In Edelman's model, dysfunction in any of these three capacities blocks change in disorders of higher order consciousness. The mind is less plastic and resilient when reentry is selectively blocked.²

² Edelman's concept of reentry, seemingly so mysterious, is actually another name for the notion in dynamic systems theory that what happens one place in a functioning system will reverberate and effect change in other places as well.
Psychoanalytic treatment promotes reentry and therapeutic change, expanding higher order consciousness by communication about and offering repeated opportunities for alternative more adaptive interactions with the nonself-environment. These interactions, repeated almost endlessly in different contexts and times, gradually strengthen new pathways in the neural network organization. Neural connections that allow new concept categorization, memory recategorization, and a greater capacity to construct a socially shared narrative of experience are strengthened.

Just as the physical environment's contingent response to the organism's biological activity is important for reentry and adaptive reorganization, the analyst's affirming recognition and contingent response to the patient's intentions within self-states is essential for change. In the transference, in the repetition of old dysfunctional patterns, the patient's experience of the analyst's recognition or disappointment in her failures to respond will set off dissociations, or breaks in consciousness. Failure by important other people in the patient's past has led to dysfunctional patterns in self-state shifts that are responsible for present-day breaks in higher order self-reflective consciousness. These dysfunctional patterns are changed when two conditions are met: First, there must be opportunity for repeated intensely experienced and action-based interactions with an environment. The second condition is the construction of a communicated narrative of present experience that includes a concept of the past. The patient's experience with the analyst in the transference meets both these conditions necessary for change.

"Breaks in consciousness" are disruptions in the flow of normal adaptive awareness. Defined in phenomenal terms, the patient feels anxious, or the patient might feel no anxiety when realistically anxiety should be expected. Often there is a sense of unreality or depersonalization. There is a shift in self-state, and correspondingly for the analyst, there can be a countertransference experience of sleepiness, distraction, nausea, boredom, anxiety, or agitation. Defined in psychoanalytic dynamic or self psychology terms, breaks in consciousness are a disavowal of longings for a selfobject experience, in connection with the analyst, experiencing them instead in a split-off context redirected toward a different object. This is a type of splitting, or dissociation, where strivings in subjective awareness that are unacceptable are reassigned to an alternate self-state where the intentions or affects originally associated with the strivings cannot be reflected on or be conscious. In the alternative split-off self-state, the selfobject experience with the analyst in the transference is the "organizer" or "attractor" that stabilizes that organization for the patient. When unacceptable intentions or affects are experienced and expressed symbolically in another way, they are split off, most commonly as behaviorally in meaningful enactments where the objectives and affective tension associated with the longings can be disguised, for instance, by being sexualized. These intentions cannot be the object of self-reflection, and hence are not communicable in narratives with the analyst. Kohut
(1971) has described this phenomenon as a *vertical split*. This has been further elaborated by Goldberg (1995) as the underlying dynamic for narcissistic behavior disorders and the subcategory of perversions. In behavior disorders the longings are expressed only in action and not in articulated higher order conscious states, and hence are not available for self-reflection.

Described in dynamic systems terms compatible with Edelman’s model, breaks in consciousness are discontinuities resulting from shifts between two states. These two states—A and B—are related because they are each part of an overarching state AB that the patient cannot experience as integrated. States A and B exist as parallel and simultaneous possibilities for conscious experience, but in the patient’s awareness, they are successively conscious. In state A there is explicit knowledge which is articulated as meaningful in self-reflective consciousness. In state B this knowledge is disavowed, implicit, and nonreflective, and is expressed in performative action. However, in state B there may be other explicit knowledge that is conscious, which in state A is only implicit and expressed performatively. In either states A or B, whatever knowledge is implicit is enacted as behavior or reflected in symptoms that have unconscious meaning. The shifts between states A and B are initiated by experiences with another person or events and circumstances that are nonobvious and seemingly unimportant to the patient, such as the lack of a longed-for response from the analyst or other important person.

Because intention and affect in either state is not articulated semantically, the states are not integrated and cannot be reflected on as meaningful in higher order consciousness. In Edelman’s model, the inability to articulate the meaning prevents the use or emergence of reentrant loops in the neural network, and precludes their integration. This reentrant loop blockage, for Edelman a biological condition, underlies the inability of the person to be aware and self-reflective about all aspects of the self-state. Because there are multiple controls of human thought and action, this blockage theoretically might be changed either by psychological or biological interventions. Practically speaking, however, most therapeutic change in disorders of dissociation is brought about through interventions possible in psychotherapeutic intervention.

For most of our psychotherapy patients, the inability to articulate and be conscious of self-states is learned. It can be learned from noncontingent or nonaffirming responsiveness, including dissociation and censorship originally fantasized or learned in interaction with parents. It can also be repetitively elaborated in current experiences with a therapist who does not recognize and respond to the patient’s self-states. Failures in consciousness can also be due to limitations in linguistic facility and concept formation. For instance, a patient, who may never have had the opportunity to talk to anyone before about a particular striving or longing, may have no expectation that it can be shared and acknowledged.
I now describe the treatment of a patient, Regina, who was in treatment eight years once or twice weekly. In this account I illustrate how breaks in consciousness can be seen as shifts between two self-states that are unconsciously simultaneous but consciously experienced successively, in alternation. The integration of these two self-states was supported by transference repetition, enactment, and verbal interpretation of the transference.

Describing the process in terms of shifts between two self-states is based on my subjective observation as the therapist who was part of the process. This is a first step toward devising a natural science method of observation, where self-states can be clearly defined, and the process can be ultimately made available to more than one observer to establish inter-rater reliability of these subjective clinical judgments.

Regina

When we began the psychotherapy, Regina was 25 and just beginning her career in advertising. She was tall, lean, intelligent, and strikingly attractive. In temperament and appearance, she reminded me of a beautiful and carefully bred high-strung racehorse. Although her new job was well within her capacities and training, she was anxious her performance might not meet the stringent standards she expected. She was lonely and bitter. She wanted to find a man, but had never been successful with anyone beyond the first few dates. She had no close women friends, and found it difficult to trust anybody of either sex. She had tried therapy recently with a male psychiatrist resident-in-training, but quit after several months because she found him superficial and insensitive. She thought maybe a woman would work better for her, but she was skeptical. I was interested in her and found her appealing in her intelligence and determination to get the right help. But I felt uneasy with her at many moments, and knew she was difficult and one of those angry people who are never satisfied. She would bite the hand that feeds her.

She is the younger of two daughters in a well-to-do family. Her mother was a chronically angry self-centered woman who felt she never got enough of anything she wanted, including clothes, attention, and condominiums in warm climates. She struggles with a weight problem and is envious of Regina’s slender beauty and accomplishments. As a child, Regina was the daughter who was most attentive and compliant with the responsibility for mother’s well-being. Now, as a young adult Regina complained of feeling hurt and angry about mother’s oblivion regarding her needs for support and acknowledgment. As a child, she never believed things could be otherwise and accepted her role as mother’s emotional caretaker. Recently, in spite of having the financial wherewithal, Mother had interfered with passive Father’s willingness to pay for graduate school, declaring that Regina was old enough to pay her own way. Now graduated, Regina
had a large school loan to repay. This apparently needless deprivation was an experience that seemed typical and was familiar to Regina from her childhood. This old familiar experience was part of the beginning transference configuration with me: even though she wore elegant designer clothes, she insisted she was entitled to a reduced fee for the therapy because her income was being depleted by repaying this loan. Her demand for my special consideration was related to the hurt and anger about her parents’ denial of her entitlement for help. Angrily she asserted her needs, trying to wring satisfaction of her needs and longings from every pillar and post, including from her therapist. Her wishes and expectations were acknowledged, but their fulfillment had always been denied.

Over the eight years of the treatment, Regina and I usually met twice a week. Most of our time was taken up with the same two manifest issues she identified as problems when we began the treatment. First, she suffered great terror that she was not doing well at work, even though it was clear to me and apparently to everyone else at her job that she was working hard and performing with excellence. She was afraid others envied or hated her, that she would be isolated, ignored, and eventually fired. Second, she was anguish that she was not finding a man who could take care of her and with whom she could settle down. In the early years, she would scream at me that I was not doing my job because she was not finding this Mr. Right. She complained as if her dilemma was my fault, that to make matters worse, she was not exactly well supplied with compatible women friends, either.

Over time I came to understand that these emotional maelstroms would abate if I held onto my hat and stayed calm. I struggled with countertransference feelings that she was insatiable and tiresome, and in the worst of it, I dreaded our sessions. I recognized her neediness and fear of revealing it; saying as much to her, I would then offer an extra session that week, reassuring her of my concern and interest in her distress. In addition, sometimes I suggested that she needed what we together called “soul medicine,” which would be something she enjoyed like reading poetry and working out at the gym. With these interventions, her frenzy would diminish. If I could identify her longing for my appreciation and acknowledgment, and recognize her entitlement to a reasonable fulfillment both with me and with others in her life, she would recover from her agitation and depression. This would also involve exploring her fantasies about why, in spite of being entitled, she believed there was no satisfaction for her.

Regina was prescribed Wellbutrin for the last six years of her treatment. In the last year, she also was prescribed Serazone for anxiety states. The introduction of pharmacologic intervention pacified her, soothing her agitation when she couldn’t immediately get exactly what she wanted. She felt this provided a safety net, breaking her emotional fall into disorganizing rageful and depressed states that interfered with her feeling connected with me and others in her life and making use of the opportunities in her treatment.
During the first three or four years of the treatment, it was difficult for Regina to accept my being important to her. She was reluctant to need much from me, although she secretly idealized me and thought I could support her and tell her what to do about getting her needs satisfied. This attitude was state A, one of the two oscillating self-states. She soon started meeting men, and for periods of several months, she might have a boyfriend. As the romance began, the alternate state B had its onset. In this state, the man was idealized as I had been, and she had hopes that he would fulfill her and make her feel worthwhile. She thought this fulfillment would be in being reassured that she was sexually attractive and worthy of his generosity. She became excited about the man and thrilled with herself as an attractive interesting woman. At the height of her involvement in each relationship, she believed that any connection to me was expendable, and feeling satisfaction from her new man she stopped railing at me for my inadequacies. She imagined quitting her therapy, because with this man she felt she had everything. Several times she briefly stopped treatment.

Soon disappointment with the boyfriend would set in. The man seemed distant, unavailable, and now seemed to have little in common with her. I became more important to her again. Although I was idealized, I was quickly found to be inadequately responsive. This was state A again. The shift to state A was driven by her disappointment in the man in state B. She gradually had realized the man could not make her feel important and fulfilled. For instance, one man continued an active involvement with his ex-wife; another was charming but addicted to marijuana. Still another was a liar and lived in another country, only meeting her for long weekends in exotic places far away from either of their homes. Some of these men were significantly older, with whom she could feel excited about her capacity to be sexually arousing, although her own sexual pleasure was limited. These men constituted a series, but she was unable to reflect on how similar they were and the obvious signs of future consequences of her choices with them. In this self-state (B), the idealized man turned out to be no good; with the shift to state A, I could then be idealized as potentially fulfilling. However, I turned out to be no good because I could not quickly and magically get her the man who would be fulfilling. As we cycled through these two alternative states, during our work together she became more realistic about what I could give her and she could feel more fulfilled by my responses to her, even though of course they fell short of my finding a man for her. This was the beginning of a more stable integrated state AB that supported greater self-reflection and expanded consciousness.

The most important point for the discussion here is her cycling from state A to state B that eventually resulted in greater awareness about her transference relationship with me. Each state was characterized by disavowal of some different aspects of her experience that were apparent to me and could also be seen by other empathic observers. One area of disavowal was her idealizing of me; the other area of disavowal concerned what would satisfy. For instance, in state B
she disavowed her idealization of me, dismissing me as unimportant. I was replaced in her esteem by another person, an idealized man. In further disavowal, she gave up any interest in my recognition of her "soul" (e.g., her reading and writing poetry), and replaced it with the goal of having a man who could respond sexually and otherwise be generous with his money and time. This response from the idealized man, in state B, made her feel thrilled and excited about herself. This man's excited appreciation of her as a sex kitten was keenly felt, at the same time as she felt little satisfaction with me in her treatment. Following painful disappointment by the man (state B) she shifted back again to state A, where she idealized me and wanted recognition for artistic expressions of her "soul." She would begin making imperious and urgent claims for my recognition and generosity. Gradually discovering my shortcomings, she again would be angrily disappointed to see that the person she had turned to fell short.

Aspects of each state were enacted, and only toward the end of treatment could she be fully conscious and hence self-reflective about these experiences in her selfobject experience with me, as transference. What had been missing in her awareness early on was the feeling of fulfillment (pleasure/aim), and the person from whom she desired the fulfillment (me) was replaced by another (a man) (object). Also, the nature of the fulfillment was sexualized (source), where a sexual response replaced a response to her "soul." In state A the disappointment was enacted with me being seen as devalued. In reaction to that disappointment, there was a shift to state B where the fulfillment was revised to be sexualized and enacted with another person. Satisfaction was in the man's response to her as a sex kitten. In state B, the trigger to return to state A was the disappointment enacted with the man who was the idealized replacement for me. When she began treatment, she could not reflect on these states as meaningful and as a context for disappointment; she could only see them as directives for action, which led to shifting the enactment into the configuration of the alternative state.

Gradually this changed, and with seemingly endless repetitions of these state shifts and with my repetitively identifying the disavowed component of experience in each state and the disappointed strivings that stimulated the shifts, she became more self-reflective. The transference (state AB), where she was conscious of a satisfying relationship with me, expanded and was more stable and less disrupted by the disappointment with me. In effect, the two previously separate self-states became integrated into one more stable state held together by the transference experience.

Over the last few years of treatment, she was able to be more contented without a boyfriend in her life, and learned to be more comfortable alone. She eventually found an ordinarily flawed man who appreciated her intensity, intelligence, and vulnerability. He was often but not always warm and sensitively responsive. Regina was able to accept his occasional distancing and self-preoccupation and
could weather the long period of his ambivalence and uncertainty about a long-
term commitment before he finally proposed marriage. This improvement moved
in step with her acceptance of her need for me, which soon let her terminate with
ordinary sadness and a more realistic assessment of her needs and entitlement.
My experience with this patient and others like her is that therapeutic improve-
ment requires a lengthy period of time, as attention is focused on the cycle of
states and the transference enactment of her needs, their disavowal, and the fan-
tasies about their being fulfilled and disappointed.

At the risk of resting my conclusions on too scanty a taste of Regina’s treat-
ment and improvement, I summarize the most essential three ingredients of this
recipe for success:

1. Seemingly infinite repetitions of the maladaptive or pathologic conscious
states and the breaks or shifts between them are required for the therapeutic
process. Eight years of this repetition can seem like a long time.

2. Actions and enactments, and their subjective salient meanings, are accepted
and investigated in the treatment. This includes the analyst being an active
respondent, a role that is carefully explored and delineated with the patient,
thus becoming the patient’s partner in the therapeutic process.

3. A transference narrative is constructed which includes labeled and shared
communicated description of the two states and whatever events or fantas-
ies mark the breaks in their continuity and moments of their shifting. This
transference narrative eventually integrates and explains the two states and
the shifts between them. This narrative must also include a story of the
patient’s past and an expectation of her future that is also relevant for un-
derstanding the present conscious states and their breaks.

All psychoanalysts know about these ingredients; Edelman’s mind/brain model
suggests why they are necessary for therapeutic change.

Repetition of Maladaptive State Patterns

Some psychoanalysts believe that the patient’s initiative to repeat painful and
maladaptive states is resistance, motivated to hinder change. This is sometimes
understood to be an expression of the death instinct, or a “negative therapeutic
reaction.” However, when we are accepting and can work empathically with our
patient’s experience-near repetitive states, we can aid a reorganization of these
states. This has been demonstrated in the account of Regina’s treatment. It rep-
resents an approach to clinical observation and technique recommended by Kohut,
and elaborated further by others. According to Edelman’s dynamic systems model,
action, including repetition of experienced interactions with the social and ob-
ject environment, is the basis of learning and an important guiding force in the

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organization of the neural networks of the brain. Action affects the biological foundation of the mind. This idea is a restatement of the association learning paradigm that is a part of modern psychology's foundation.

In Edelman's model, Regina is like many patients who come to us for help: her neural network was organized in conjunction with maladaptive behavior and breaks in the flow of conscious states. The already-formed organization of connections in the brain cannot be erased, nor can they be made irrelevant or supervened by the advent of a higher developmental order of some kind. The reorganization requires making new connections through a reentry process, based on repeated new experiences that are simultaneous with the possibility for the old pathologic experience, until the new pathways of interaction become stronger than the old. When disorder interferes with the functioning of higher order consciousness, as is usually true for patients in psychoanalysis or analytic psychotherapy, this essential repetition must be accompanied by a self-reflective process which can be promoted by psychoanalytic techniques of interpretation. The presence of self-reflection, as supported by the communicated articulation of subjective experience of the transference narrative, will be simultaneous with emerging conscious new states. Communication with the analyst via the shared instrument of language facilitates reentry and the reorganizing of memory and conceptual categories.

Treatment Includes Action and Enactment for Analyst and Patient

The topic of enactment in psychoanalytic treatment has been recently and hotly debated (e.g., Renik, 1993). Many analysts are now appreciating its importance as an adjunct to self-reflection when it is understood as part of the transference during the therapeutic process. Enactment is no longer seen as a deterrent to self-observation. For Edelman, action is broadly defined, is a feature of conscious thinking and fantasy, and is not restricted to enactment. Action is crucial for change when it is experienced in conjunction with understanding and interpretation in the transference, in the present real-time interaction with the analyst. Enactment and other actions are essential for reorganization. Action guides the selection of pathways in the biological neural network. Whether enactment is considered novel interaction or repetition of the old, its meaning must be articulated and shared with the analyst in order to support an expansion of the patient's higher order self-reflective consciousness.

Construction of a Transference Narrative That Integrates Past, Present, and Future

Edelman's concept of "salience" is helpful for understanding transference and other forms of repetition. Salience was defined earlier in this essay as an aspect
of inherited or acquired value that is an attraction directing response. As they appear in the higher-order consciousness disorders of our patients, saliences are patterns of intense strivings for an experience resulting from an action or a response by someone important to them. As the treatment proceeds through its early stages, the analyst encourages the patient to feel the analyst can be important. As the therapeutic relationship is established, only when addressing the transference as the re-creation of typical maladaptive or disappointing relationships are we in a position to work with acquired maladaptive salience. The repetitive patterns in the transference are influenced by the salience or intensities that are aspects of acquired values. Reworking of meanings in the transference occurs, along with replacing old acquired values with new ones. For Regina, the treatment gave her the opportunity to change a maladaptive value that was transcribed as the salience of a man’s response to her sexual and physical beauty. Instead of the fulfillment of that ultimately unsatisfying longing, with the new acquired values her strivings were redirected to a man’s or woman’s response to her authentic self, or her “soul,” as we called it. In Edelman’s model, changes in salience due to newly acquired values result in the reorganization of the neural network in the biological brain.

The importance of articulating and communicating with the patient the heretofore wordless experience of states and their moments of shifting is not a new idea in psychoanalysis, and Edelman is cognizant of this in his mind/brain model. In his view, symbolic memory, dependent on language or some other forms of symbolic social communication, is necessary for the construction of a social selfhood. Change requires a narrated socially sharable construction of a model of the person’s past. This frees the person from the limitations of the immediate time frame and the ongoing events occurring in real time. This also allows her to anticipate future states and to make plans to mold the world for her own purposes. In Regina’s treatment, the ongoing labeling and explication of meanings for her current experiences in present time was an important part of our making a story of her past life experience. This was as important for the narrative as any explicit memories of her past; in Regina’s case, the construction of a present real-time narrative of ongoing experiences was probably even more important because she had few verbalized memories of her life before prepubescence. For the biological brain, narrative changes during treatment occur in tandem with the evolution of new reentry paths in the brain morphology.

For our patients who, like Regina, are entrenched in maladaptive state patterns, it is necessary that the narrative of the present be constructed in an affectively intense relationship with an important person. This salience is found in the transference relationship. During earlier life, in childhood, this narrative construction will optimally occur with parents who share and recognize their child’s subjective experience. The analyst provides opportunities for the person to have significant experiences of recognition for their subjectivity, and in this
sense, psychoanalytic treatment is similar to this one facet of optimal parenting. Recognition on all levels of the mind/brain is essential to the course of ongoing reorganization during life. However, the objective of psychoanalytic treatment is reorganization and not the reengagement of epigenetic development. Early relationships with parenting figures probably always are privileged in influencing development. The psychoanalyst may not expect to redirect development, but perhaps will be content with success in supporting the patient's self-directed reorganization.

References


A Case Study of an Autistic Child
A Reappraisal

SUSAN M. FISHER

That mind, consciousness, human experience, and subjectivity emerge out of the developing and organizing neurobiological matrix has become the shared focus of neurologists, neurobiologists, and psychoanalysts in the recent decade (Edelman, 1992; Levin, 1991, 1997). Interdisciplinary work on neural development and anatomic localizations have given credence and vigor to psychoanalytic developmental models; the unquestionable facts that we live in our bodies and that our sense of self is rooted in a period well before language begins have been further deepened and enriched by recent research exploring the interplay of mind and brain.

That brain plasticity is constant until death, that brain cells are not, as we were taught, given in fixed numbers like eggs in the ovary at birth, that brain cells are altered by their physiologic environment (why identical twins are never identical) is exciting news indeed. These emerging neuropsychological concepts and explanations root psychoanalysis in modern neuroscience and enhance its legitimacy as a technique for personality transformation.

All experience alters brain function. For example, Position Emission Tomography (PET) scans reveal different areas of the brain activated by focused episodic memory—the kind of recall of detailed past experience that is used in history taking and by random episodic memory—the uncensored, spontaneous thinking that occurs in psychoanalytic work (Andreasen et al., 1995). PET scans done after successful psychotherapy, cognitive and behavioral, for obsessive-compulsive disorder look the same way as scans done after beneficial use of antidepressant medications (fluoxetine), and both kinds of treatment, talk and meds, produce diminished cerebral metabolic rates for glucose in the caudate nucleus (Baxter et al., 1992; Schwartz et al., 1996). A recent report compared serotonin levels using complex brain imaging techniques in two matched young men with personality disorders and depression. Both men had very low levels.
After a year of dynamic psychotherapy one man had normal serotonin uptake. The untreated control remained at the original low level (Viinamaki et al., 1998). We know from all this only that two kinds of input, talk and meds, change cellular function. We do not know from this how the caudate nucleus relates to obsessive-compulsive symptoms or that a diminished serotonin level is the root cause of depression.

On the other hand, it is important to remember that although mind and brain interact they never quite explain each other and that although the epigenetic models of psychoanalytic development correlate with those of neurological development, from that correlation we can never infer causation. One can locate the body self origins in the cerebellum, emotional tone in the amygdala, and memory integration in the hippocampus; but with increasing complexity, systems and functions develop that cannot be explained neurophysiologically in a way that captures personal meanings, their elaborate structures, and the stamp of uniqueness. The phenomenon of consciousness has its own logic and explanations and meanings appropriate to it. It is a nonreducible phenomenon, a functional property of the interacting whole, although it can be destroyed in a moment with a scalpel.

We will always deal with the limitations of homologies and the seductiveness of simultaneities. Reductionism is always lurking around the corner. Purpose and mechanism are different; correspondence and causation are different. Mind and brain interact, intersect, even create each other, but they never can fully explain each other. Things happening in parallel are not necessarily homologous, and one need not be the cause of the other. These are a few of the constraints on our wish for magical solutions to impossible questions. Yet the increased understanding of the complex interaction of mind and brain makes psychoanalysis extraordinarily more plausible as a technique for change and development.

In thinking about the imponderable questions of the interaction of mind and brain in early development, and the emergence of consciousness and the roots of self-experience, I have reconsidered my own conceptualization of a treatment case that was significant in my development as a psychoanalyst. I wrote about it many years ago (Fisher, 1975) and presented in that essay some speculations as to how and why this autistic child developed. Those notions still hold, I think, but I now have some additional hypotheses and explanatory ideas that have grown out of my increasing appreciation of the potential impact of the analyst on the biological matrix at the earliest levels of personality development.

I began my speculations about the case by thinking about the transitional object, that object described by Winnicott (1951) as both internally created and objectively perceived, alive in the developing child’s inner world, simultaneously part of the inner fantasy space controlled by the child, and a piece of “external reality,” its character defined by and shared with others in an “out there” space. Used as a bridge from one reality to the other, changing its character in each, being a part of an unchallenged transitional border territory, the transitional ob-
ject functions in the developmental phase of separation from maternal environment and also as part of the lifelong task of separating internal from external realities. Essential to its function is that the transitional object reflects a neutral and unchallenged area of experience.

I then argued that in ordinary, adequate development there gradually differentiates out of the initial reality matrix of mother–himself an awareness of an "out there" subsystem of neutral, shared elements which the child can operate in and upon. The interactions with the "out there" are fundamental to the establishment of the child’s own personal reality. The later transitional stage, appreciated by Winnicott (1951), reflects the child’s individual attempt to integrate and tolerate the separate existence of others with different personal realities.

When we speak of the capacity for meaningful transitional object usage, however, we are assuming the child has already experienced some engaged interaction with aspects of external reality. For there to be a transition between the unit of world–mother–self to the world of experienced, separated objects, to the world of “not-always controllable” persons or things beyond self-created imagery, we assume there has been established as a base some playful, masterful, self-generated interchange and experience of objects in “public spaces,” giving the child an engaged acceptance of “that other country” beyond the inner fantasy life to which the child can travel and from which he can return.

That this awareness of an explorable world of things and people can be undeveloped or extinguished was observable in my work with this autistic child. I attempted to help this patient find a field for him to operate in and upon. This was not a transitional field between inner fantasy and outer reality, because there was, as yet, no outer reality to which he related with aliveness. A field was needed that could become the first outer reality in which he engaged with personal interest, without compliance to another. I attempted to create such a field with him. Much work went into making initial contact with this boy. After that, still further work was needed to develop a bridge from what he experienced as the inseparable unit of him–myself to a “territory” as yet unexplored by him and inconceivable to him. I believed that out of such an exploration he might "create" his own awareness of external things. Before there could be transitional objects and spaces, reflecting an emerging tolerance of separation, there had to be an acknowledged, interesting, masterable, relevant outside world.

This field evolved around a Coca-Cola machine. And as that field was firmly established through his complex, paradoxical use of the machine and extended beyond it to an ever-widening personal world of humans and objects, the meaning of the machine to him and its place in his evolving person gradually shifted to the forms of a true transitional object.

At age six, Billy was unwilling or unable to use language. He had been variously diagnosed before I met him as atypical, psychotic, autistic, brain-damaged, retarded, with visual-motor and perceptual disabilities, poor motor coordination, and poor attentional capacities. When I first observed him, he made animal noises,
grunting, squealing, throwing toys, running back and forth in and out of rooms, gesticulating, barking like a dog, groaning, contorting his body, rolling his eyes to the top of their sockets when someone approached him, unresponsive to voice contact, recoiling at imminent physical contact, and becoming limp and falling to the floor when touched. He was fascinated by the rotary action of merry-go-rounds and fans, turned light switches off and on, watched record players turn, listened to music, and was unwilling to let anyone read to him. He was thin, pale, large-eyed, always frowning; when quiet, he would lie in a fetal position. He was concerned about eyes, poking at eyes of others; he would scream in terror and agitation in the presence of balloons or a plastic Boppo. His only comprehensible sounds, over and over, in high-pitched singsong rhythms, were, "Will it pop?" Without any direct acknowledgment or interaction with his peers, he had an uncanny ability to provoke savage attacks upon himself.¹

Confounding the diagnoses of organicity were his abilities to use climbing equipment and to kick well. All clumsiness abated when he thought himself unobserved. Complex neurological and psychological testing, the best available at that time, varied from "total incapacity" to "near age level," depending on examination conditions, the personality of the examiner, and the level of his distress. Perceptual distortions lingered but were mastered in the classroom during the next three years. I dealt with this range of diagnoses and predictions by assuming he had some kind of neurological lag and a variety of nonspecific constitutional vulnerabilities that I could not allow to predetermine my expectations of the treatment and condition my thinking about him. I was impressed at the time with the amount of sadism this boy evoked in everyone who met him, including myself, and the amount of mockery and skepticism I elicited for taking on this case. I thought a great deal about the sadism problem. I disavowed the criticisms of myself, which faded as he improved.

The mother, chronically tired, depressed, and pallid, seemed unconcerned about the child, did not mind his lack of speech and nonparticipation in family affairs, and appeared for evaluation only at the urging of his nursery school. Socially isolated and markedly unobservant, she dwelled, much later, in her own treatment, on her intense fears while pregnant with Billy, her anger at her husband and children, and her private conception of this boy as living out her own despair. During the months in which Billy became verbal, bringing home schoolwork, laughing and chattering gaily about his friends and activities at the therapeutic school, his mother was unconflictedly nostalgic for the mute, wordless bygone times. She preferred her daughter and felt uncomfortable interacting with male children.

¹Details of this case derive from my original essay. Permission has been given by the American Academy of Child and Adolescent Psychiatry to reproduce them in this volume.
Such details of the patient's life as could be elicited came from his father, a biochemist, a tall man who spoke with difficulty, stumbling when anxious, in a flat, harsh, monotone. He made little eye contact, had an unvarying wooden expression, and a staff member observed that he held an infant sibling of the patient on his lap "like a block of wood."

The patient was the second of four children, the first son. His sister was five at the time of his difficult birth. All of the mother's pregnancies were disrupted by third trimester bleeding, necessitating bed rest, and two miscarriages had occurred before the patient was conceived. He was born two weeks late in the most painful of all the mother's deliveries, and from the beginning was not felt to be a cuddly baby. He was given less care by his mother than his elder sister and the later siblings, because she was again pregnant and fearful of another spontaneous abortion. His mother was afraid to lift him, and between 8 and 11 months he was cared for primarily by a nursemaid to whom he was said to be attached. The nursemaid left the family when Billy was 11 months old, and he is described by the father as henceforth being unresponsive to separations from his mother or others. The quality of his care before the nurse arrived could not be ascertained, except that it was less attentive than that given to the other children; the parents, when interviewed, could not focus on his infancy in detail. In later treatment, the mother remembered having paid very little attention to him.

Billy was bottle-fed and experienced severe colic during the first two months; no feeding problems were reported. He crawled early, walked alone at fifteen months, and was toilet trained at three years in three weeks' time. He talked for a time at three and one-half years. His elder sister also began to speak late, but was fluent and verbal from three years on. Subsequent experience with the family established the inadequacy of parental perception and appraisal and a frequent distortion of fact and mood. For example, they reported that the boy had no sleeping difficulty, but later it was learned that the patient wandered through the night, coming into bed with his father at varying times during the night and in the morning, and that all the children randomly slept with the baby, getting in and out of his crib.

Billy's mother made frequent references to her investment in things being "pleasant"; pleasant amiability characterized her conception of herself, her marriage, and particularly the relationships among family members.

The only acknowledged difficulty with Billy was discipline. The father matter-of-factly reported that the child was beaten once or twice daily and locked in the basement in an attempt to control his temper outbursts. His mother also spanked him; neither parent felt their disciplinary methods to be noteworthy, and his father was able to cease the beatings only when it was pointed out that they had failed and when substitutes were suggested. The boy was not permitted to leave the backyard and play with other children because of dangers of the street, and parental conviction that he would be rejected by his peers.
The patient had been treated with Dexedrine and Ritalin, with no improvement. I discontinued all medication.

Initially, I forced, carried, dragged the patient to my office. He behaved as earlier described and repeated, "Will it pop?" I answered, "No, it won't; I won't let it; we won't let it," or "I will fix it" in myriad repetition, a back and forth whose meaning transcended the formal content and was reminiscent of the "lalling" behavior, the sheer pleasure in sounds, as the base of language symbolization (Langer, 1942; Weir, 1962; Vihman, 1996).

Using blocks and inflatable toys, I invented "games" based on constructing, tumbling, falling down, inhaling, exhaling, and changing shape and contour. I assumed out loud that he would handle, tumble, break these materials. At first, I would do it alone, but gradually he joined me, and then I watched as he began to do the pushing and pressing alone. I would help him reconstruct the original formation, and always I would be talking, using whatever from him or from myself could be a clue that seemed to reflect the transference-countertransference flow. Sometimes I talked to bring him sound, or simply to keep going, halting sessions only when the sadism and despair he frequently evoked might erupt in a form with which neither of us could deal. A team of teachers, counselors, and social workers met and struggled with similar fluctuations.

Gradually over several months, I emerged as a being with whom he became openly preoccupied, and language—sounds—appeared. These were very difficult to understand. They emerged concurrent with his concern with my body—with touching and stroking, which had the same repetitive quality as the sounds he repeated. Sounds and gestures were always accepted by me; sometimes they were restrained, sometimes they were interpreted. At this time, there were no pronominal distinctions, no time distinctions, no ability to distinguish living flesh from pictures, or photographs from present spaces: a poster of San Francisco was as alive as the Washington, DC, in which we lived. No continuities existed in ideation or conception of himself or others. A change in my hair arrangement provoked panic that could be soothed only with time and repetition of interpretations of his struggles. Later when he could talk and issues of continuity of body contours and existence over time were less charged, he told me that when my hair was up, it contained all the cut-up pieces of his genitals, hidden there, and we agreed that he had been very brave to stay with me then. He seemed pleased that I had waited six months for him to tell me "that hard thing," different for him from many interpretations I made because it was something of "his," a new delight.

Experience, I sensed, was a chaotic, agglutinated or fragmented, overstimulating mass of impingements upon him, or else a vast silence from which he and I seemed to evolve into his awareness as an undifferentiated unit. Over the next two years in which we worked together, we explored the outer environment, and he was more and more able to formulate the stuff of his inner world—fantasies, terrors, rages, jealousies, disappointments, and his cognitive struggles. He de-
veloped the capacity to come alone to the sessions, began to discover "play," spoke clearly, read, developed much whimsy and humor, and made friends among his peers.

Four years later this patient was fully verbal, well coordinated, and his cognitive skills were developed to age level. He was attending public school, and engaged in relationships with peers, teachers, siblings, and fellow Cub Scouts appropriate to his 10 years. The therapeutic work around these phases of his development are not included in this discussion.

I focused 25 years ago on one early aspect of Billy's elaborate treatment—that of helping him to extend life beyond myself. Having made contact, having become a somewhat safe primary object for such a boy, I had to ask, what then? The world beyond me was fearsome to him, and he had little competence with which to explore it. What he had mastered had a mechanical quality that he seemed not to connect to himself at all. He moved like a robot, without spontaneity and laughter. That another person had entered his world sometimes seemed a presumption of the therapist, my ruthless conviction that he could and must grow up and must be able to feel and share any impulse in his being. He knew that he lived and failed in the world of six-year-old demands and achievements; what seemed to be blossoming in him was a network of feelings and signals related to the earliest of life's experiences—the beginnings of liveness and trust and human contact. But these beginnings, however vital for real growth and future individuation, could not bring him to the emotional and cognitive level of his most disturbed peers. This was a contrast he felt, and it had to be eased.

As Billy became focused on my body, he began to acknowledge an interest in food around me. I noticed a particular delight he took when I brought him Coca-Cola—holding the bottle, exploring its shape, and the mouthpiece. He would not at this time leave the office during sessions, and the moments of bringing and returning him to class at the therapeutic school belonged for him to a different order of time. I offered him as much Coke as he wanted and told him that there were limitless funds for Coke during the therapy hours, as much as he needed and wanted, and he could determine the quantity. I repeated that we would get the Coke together and that we would go through the hall together into the big lounge which was the meeting place for the psychiatric treatment center. It was important that we go because it was important that he have what he wanted and needed, and that he should get it himself.

Billy demanded that these remarks be repeated over and over. He was most alarmed at leaving the office. Clumsy, he stumbled in the hallways and in the strange setting. He was deeply afraid to initiate any motion toward the bottles. (No aluminum cans then!) Day after day, hesitatingly and then with increasing lust and vigor, he drank more and more Coke; he could have it only if he put the money in himself, pulled the bottle out, and uncapped it. I would share all aspects of the motions, his pleasure in the sounds he made, the slurping, spilling, laughing. I was free with all responses about the procedure of getting and having
the Coke, but the reaching out was his—and with this machine, he learned to use his hands; read; manipulate money, caps, bottle openers; coordinate multiple motions in sequence; and, under his own control, experience his physical needs, and put his own stamp on the chaos he had fled from. His face glowed with pleasure as he showed me his increasing skills, and stood before me, 8 or 10 Coke bottles held precariously. He would stand against the machine as if he were emerging out of it. He would scratch it, beat on it, touch it as he read from it, and lean against it or run back to it as he watched or talked to others and began to explore surfaces away from it.

I observed and participated in the many fluctuating uses of the Coke machine. The machine seemed to be an outgrowth of the therapist into the world, an object that, though it was clearly an extension of me to him, could also become more than me. It was an object he could use in ways he could not use me because of his age and the conditions of treatment. His fantasy could flower within himself and extend beyond the literal limits of my body and his conception of my body into an increasingly accessible spatial field, and yet be simultaneously and safely expressed onto an object that was also me when he needed it to be.

The machine was less than the therapist. It was neither of us, and so it provided an opportunity to understand what “neither of us” meant. It was to become a gateway into what for him was the “nothing” out there that existed beyond the edge of the developing unit of “him-myself.”

Gradually it became “his” Coke machine, the other “place” besides me, a “place” we went together, and his walk became more vigorous. Retrieving the Coke became much more than its obvious nursing function; it was simultaneously a bridge to motility and social contact, directed by him with pleasure and curiosity. Back in the office, having the Coke would sustain very trying explorations into newly conceivable areas of fear and memory.

One day, after months of using the machine, we found it empty when we arrived. The delicate structure he had created was shattered, and his face and body reflected the most profound distress. I explained. I could do nothing. Tomorrow there would be Coke. The Coke man would come tomorrow. No, I could not be absolutely certain, but I believed it. Let us find a substitute and let us somehow share this loss, this rage at the chocolate milk substitute the cook found to give us, this bewilderment at what I knew to be, for him, the first failure of my power, as well as the penetration into our lives of “another”—the powerful Coke man.

At 8:30 the next morning, he watched the Coke man refill “his” machine. A field outside himself had been annihilated and restored. He said, “Yesterday the Coke was empty.” He had never used a time referent before. He had only asked, “What is yesterday, when is tomorrow?” on many occasions. The sense of time that had, somehow, been developing in him was born then as something he used for communication.
The machine was, in some way, the live body of the therapist, to be explored; but in this extended form, it was simultaneously an inanimate object like others. As an inanimate object, it became a first step to the recognition and differentiation of other inanimate objects. Under these various aspects, the machine could involve him on the many levels of his awakening being. He began to explore other inanimate things—cars, switchboards, public monuments, light posts, stop signs—more and more assertively. My presence became less and less essential for his reaching out. Linus’s blanket and the Teddy bear bridge a gap between mother and the world of external objects, a world the growing child has already explored while psychologically not yet fully differentiated from his mother. For this boy, the Coke machine was the link between mother and the simultaneously-being-created world of things out there, an object and a cosmic field in which he could really first function and feel part of outer reality.

In daring to reach for Coke, Billy was daring to take something from another, to acknowledge the existence of things outside himself, to value them. On another level, he was beginning to experience an infant’s sense of closeness/merger/fusion, this time as joyful rather than terrifying and as a state from which he could emerge. These unrestrained ecstatic moments were part of the larger experience with his therapist.

He learned there about differences. “Do you like Coke?” he would ask me. “Yes.” “Do you love it?” “No.” Very alarmed at that implication, he went over and over it, and, in time, he tolerated this hint of differentiation.

Gradually the Coke machine itself moved from its function as the first external reality emanating from the therapist to a true transitional object, as discussed initially. As he developed friendships in school and shared himself there and at home, the Coke machine receded into the background of our work. Its meaning and usage became private to him. He drank Coke in other settings and spoke of it less frequently. Therapy continued with only intermittent references to Cokes.

This patient had to construct his own reality. We are always to some extent constructing and reconstructing our realities from inner private symbols and roots, although we accept the common public definitions of external reality. A paradoxical shift for this boy was that the Coke machine became human, animate, and relevant in the way that he and other humans had been machinelike, wooden, and mechanical; yet its inertness—its nonhuman qualities—permitted a range of skills to be developed with aliveness, and struggles to be played out on it. It permitted discoveries of limits, time, differences, sickness, greed, disappointments—to be played out on an “it” that could then easily extend to his peers, which could extend indefinitely.

As an extension of the therapist, the machine became a surface he interacted with, from which he could build a sense of the world that he could live in without, at that moment, losing me. In this new world, the ultimate loss of the therapist had a place. It was a world where uncertainty could enter. “Will I get sick?” “I don’t know” became tolerable to him.
For the chaos of his fragmented, shattered world to coalesce, Billy needed an extension of me to act as the anlage for the cosmos, so I could then try to share with him whatever his experience required. Once the machine had become for him an extension of the therapist-himself-world, he needed an experience of unlimited gratification, held within the boundaries of the sessions, and, on other levels of his consciousness, always directed toward the work of therapy.

In optimal development, external reality has liveliness and potential satisfaction and challenge well before the struggle over separation begins, and the transitional object can then be used as the bridge between the self and others. For the autistic child, or course, all this has yet to occur. In some way the therapist must help make outer reality relevant and personally connected to him, as well as contribute to the growth of his viable self. If the therapy succeeds, the child may then care enough and function enough to build his personal bridge to the world with his blanket or his Teddy or his Coke bottle.

When this process was sufficiently advanced, the live qualities of the ambiguously experienced machine came to be derived from a newly born fantasy life that was truly “within” because there was now a viable and reliable “without.” The patient became very playful about the machine, and he treated it as a true transitional object—alive, not alive, the therapist, the world, whatever he wanted it to be. His conception of it lived within a potential space that existed between the boundary of himself and others, a space he could move within. As he became surer of that freedom, of the therapist’s tolerance of that movement, he gave up the Coke.

The capacity to play and the development of charming humor around this time seemed to be inseparable from the development of a boundary between himself and the world of others. This capacity reflected his growing experience that the existence of people and objects he could not control could be not merely tolerable, but personally managed. He was now capable of a reflexive interaction among self, others, and objects. This interaction could carry the variegated inner hues of feelings and private symbols and images into the experience of the inanimate world. World and self enriched each other. And in this interplay of world and self, he began to integrate the most profound paradox—that his own reality was different from those with whom he had once been fused, yet could be contained within a larger community.

As I look back on my thinking about this case, during the treatment and afterward, I remember as vividly as if it were yesterday my perplexity, my sense that I was participating in something that was in an inexplicable way working, a therapeutic collaboration whose efficacy was entirely unexpected to myself and to the variety of experts who at first scorned and then shifted their views of this case. It was important, actually, that the community of colleagues shift their attitudes because I attempted, with some success, to turn the entire hospital into a “designed for Billy” therapeutic milieu. I spent a good deal of time with the cooks, switchboard operators, elevator operators, and handymen explaining this
child so they would not be what we now would call "grossed out" by this initially repulsive-appearing child as he staggered, stumbled, and fell into their personal spaces.

I understood how developmentally disabled he was with a variety of constitutional peculiarities and maturational delays and that there were clear peculiarities of speech and thinking in the father and delayed language development in all the siblings. The neurological diagnoses with which he came to the therapeutic school were considered sufficiently severe that therapy had been discouraged: autism, retardation, psychosis, as well as a variety of dissociations between eye and hand and mind and body. I did not want to be discouraged by the convictions of experts that there was no hope for this child.

I see his psychiatric diagnosis now as secondary autism with elective mutism and a variety of constitutional deficits and developmental delays. With all the unanswerable questions that remain in my mind, it is clearer now what I was doing. I wrote my speculative essay 30 years ago about what I thought Billy was doing, creating, constructing, with my help—what his emergent experience seemed to me to be. I had no conceptual framework that satisfied me for what I was doing beyond participating in and facilitating what seemed to be happening in front of both of us, like a new road being carved out of a wilderness. If it was working I would follow it. I had clear therapeutic principles and as much understanding as anyone around me did in this peculiar situation, but I could only later conceptualize it in terms of a hypothetical stage before transitional object usage could make sense, the establishing of a field for the later use of transitional objects as conventionally understood at that time. I saw that there was something remarkable happening around the Coke machine; I still think I was right about what it meant to him and what he was doing to and with it. But beneath the poetry and the phenomenology was harsh biology, and I had no conceptual framework to describe what I was doing at that level.

What I think now—in addition to what I wrote before—is that I was organizing the chaotic experience of this chronically traumatized and neglected psychotic child arrested at the earliest level of psychobiologic emergence. I was functioning as a biological stabilizer, providing an organizing function for faulty neurological development and the missing compensatory help adequate early parental care might have provided.

In retrospect it is clear that my intense preoccupation with him, geared as it was to his needs and manifestly cognitively driven as it seemed to me to be at the time, provided the kind of constancy of environment—I was the environment—that was required. It was as if I were the total container for all his needs, and the peculiar confluence of my life situation at that time made the provision of these functions possible without the depletion of myself that would have burdened his growth. I took him on as a research case, out of curiosity and out of outrage that he had been written off. I had sufficient self-reflective skills at the level in which I was moved by this boy to appreciate that working with him
served many functions for myself in my development as a clinician. I was restless, bored, and irritated by the constraints of the nosology of the day. I had some small awareness at the time of the subtle and complex identifications that fueled my commitment to this child and my relentless determination to reach him.

As I look back on this case, given this boy's deficits and traumas, it seems now that in this earliest phase of the treatment my functions for this child were entirely prepsychological—that my activities and my presence were contributing to completing, altering, and shaping his neurological development, as if this traumatized child, because of his developmental deficits and the continual retraumatization and neglect, was like a preemie or a neonate for whom I functioned as a pacifying, calming, organizing total environment; that what was happening in this early phase of treatment corresponded to the earliest development, when we are so far from language, when mind is not yet emergent from body. I think now that this was virgin territory and that my sense that this was a research case was not far off the mark.

I saw myself as the architect of a total therapeutic environment for this boy. In my most discouraged moments, I would think of Dr. Itard with the wild child of Aveyron, remembering how madly curious he had been; my grandiosity, however disciplined by altruism, was still operant. My preoccupation with Billy was calm and constant. I knew I must never promise what I could not deliver. It did not occur to me then that my presence, my involvement with him functioned at a biological level to stimulate what was latent, to integrate what was inchoate, and not only to create with him the beginnings of a self, which I did conceptualize at the time, but also to provide pieces of an undeveloped neurobiologic experience—that his developmental failure was so early that my reliable presence was somehow used by him the way the absent or delayed "healthy" biological environment would have been used. I was participating in a kind of rewiring of what was there or newly wiring what was close to the fundament, close to what should have been hard-wired had he not had both specific constitutional vulnerabilities and parents (with perhaps the same or similar liabilities) who could not be the properly stimulating, responsive caretakers of the earliest psychological environment.

Certainly there have been moments in work at archaic levels with either very ill or highly sophisticated patients in a functional regression where it has seemed that we were working at the edges of the earliest sensory-motor, prelinguistic, preoperational forms of experience, seeming to alter even their biology. But these were people who had developed the capacity to symbolize in some parts of their personalities and who had lives. This was all minimal or absent in this child.

Yet from the concreteness of the block towers we built and the thousands of repetitions of "will it pop" there seemed to develop a range of capacities that had not been there before. His energetic capacity and driven willingness to repeat had the qualities of the earliest throwing out of multiple neurons which
were then stabilized by my limitless repetitive responsiveness. His later multiple forays to the Coke machine which was both myself and the newly forming world had a quality of the shaping and carving of new functions that characterizes the early nervous system as it continuously overproduces and then prunes connections and "sculpts" the emergent brain. These are, of course, metaphors and analogies only, but the pattern of this child's emergence into psychological life is remarkably like the shaping of the early nervous system.

Were these new developments or old ones reclaimed and newly built upon? Both, of course. There were signs of some capacity to symbolize and fantasize in the variety of mumbo jumbo he began to utter, expressing some self-awareness within each of his utterly nonintegrated states of being, which suggest that he must have, at moments, made it to Mode Two of Gedo and Goldberg's hierarchical model and then regressed back to Mode One (Gedo and Goldberg, 1973; Gedo, 1979, 1988). After all, he had had some language at one time though it had been "gone" for years. Did he really have language, lose it, and re-create it all over again with me? Or did he have it, bury it, and rediscover it in the safety of our work? I could not tell, and, when we discussed his lost language after he became fluent, he could not remember.

I think he grew to become able to describe his internal experience of the early neglect and trauma in the six-year-old images of locating his vulnerable injured genitalia in my tied-up hair. Had he put his developing body self bits into my upswept hair for safekeeping because he could still not manage these newly forming shadows of memory and fantasy? Who would ever know? Were these entirely new ideas or old memories now safe to conceptualize, to share?

My work with Billy poses a dilemma. My essay describes in experience-near terms what happened. How and why it happened—how and why structure developed—is more difficult to explain.

There are three reasons for this difficulty: First, there is the problem of the observational perspective. Clinicians tend to view the therapeutic experience from an observational platform of a two-person therapeutic relationship, utilizing all the data of such experiences: his feelings, my feelings, ideas, fantasies, actions. Billy could in no way be his own informant for a very long time. No one had access, as a privileged observer inside his head, to note the processes by which isolated neurobiological and psychological elements coalesced into integrated, stable, patterned formations of structure and meaning. I was operating with a primal process that occurs well before language.

Second, there is the isomorphism problem, which I hope Dr. McClintock will address. What may we infer, legitimately, from reliable observations about his behavior, as to what might have been happening at the various levels of intra-psychic and neurobiological development, particularly at their interface?

Third, there is the time-dimension problem. Development requires time; it involves an ever-changing process. If my work initiated, facilitated, and integrated new developmental experiences and levels of new psychic structure for
him, the salient processes inevitably had to evolve and alter in their dynamics and in the relationship of their component factors as his total personality was developing. Here the functions or role or relationship I played must have varied enormously over time. I was operating simultaneously at different time stages in nonlinear ways as if I were in a time machine. At different times I must have been a selfobject, a transitional object as well as part of a transitional object complex, a container, a libidinal object, a teacher. Above all, for a long while I was THE environment, and in that critical phase, I encouraged in my total acceptance of all activity and sound coming from him what neurobiologists call the overproduction of neurons, which could then be selected by my conscious and unconscious reinforcement of what was, to me—with him—a functional human connection. We must have maintained the ones that worked, for him, for us. We shaped this together from what we uniquely brought to our encounters. At this level Billy and I were dealing with a biological deficit he shared with other members of his family, an inability, perhaps, to pattern, to shape, to organize the input of stimuli. He could never tell me what resonated or felt good. When I was the total environment, what we were doing was creating the psychological out of the neurobiological. I was the matrix, functioning at a level that was somehow equivalent to a cellular neurological environment from which structures emerged. Later we could talk. Before then we can only infer.

Where was the creation of the psychological out of the biological? It had to be in the dynamical processing of our experience, the dynamic interplay, the back and forth, between us. As hydrogen and oxygen are known to be the essential elements producing water, that information cannot account for the quality of water: the wetness of water is a dimension of the interaction of the molecules that cannot be reduced to its components. A hundred years from now, if some psychoanalytic archaeologist happens to stumble upon this essay, that person would undoubtedly have a much more pertinent and complete range of theoretical ideas, with evidence to explain the how and why of Billy’s dramatic transformation. But in our present efforts to explain such structural change to assign sufficiency to any one factor or any one specific theoretical concept seems to me to be overly simplistic, grossly reductionistic, bordering on the ridiculous.

All I know finally are three things: I stuck it out, against all the odds. I always felt myself to be a Good Object even when I was a nonobject in his experience. He changed structurally.

So the case of Billy raises more questions now than 30 years ago when he raised so many questions. It is a measure of the distance our field has come that the explanatory metaphors we use to understand and communicate our work have deepened and now not only comprehend and attempt to encompass individualized, phenomenological, and psychological meanings, but also to reach down into the biological roots of human experience.
References


Discussion—Psychoanalytic Talk and Neural Sculpting

MARTHA K. McCINTOCK

If we embrace the basic assumption that therapeutic talk changes the brain, an assumption that has received empirical support, the questions then become, Which aspects of the brain are changed? and What are the points of transduction between meaning-making and synaptic function? One strategy for addressing these daunting questions is to extend insights about development of sensory neural systems to the development and restructuring of the neural systems mediating attachment and social embeddedness.

In addition, a reciprocal strategy is required. Our current knowledge of neural dynamic systems is insufficient to answer these questions about mind-brain relationships. It is also necessary to use therapeutic insights and successes, such as this case presented by Susan Fisher, to pinpoint the functional aspects of neural system change and development. This strategy is akin to Sherrington’s (1948) exquisite understanding of the functional and dynamic properties of behavior that demonstrated that neural conduction was an insufficient mechanism for explaining behavior, and enabled him to postulate the functional properties of the as-yet undiscovered synapse.

Fisher states modestly that there are three things of which she is certain: (1) the neural structure of her patient was changed; (2) she was a constant in the interaction; and (3) the process took time. Let us use her insights to structure what is currently known about neural development that can elucidate how therapeutic talk might change the brain.

Structural Change and Neural Development

Neural development can be divided into six phases or stages: neurogenesis, migration, differentiation, synaptogenesis, cell death (apoptosis when most cells are lost), and synapse rearrangement (loss and development within specific brain...
areas and neurotransmitter systems). What is the source of the specific neuroanatomical structures that can represent experience?

One key factor is the functional activity of sensory neurons. For example, the mouse has a brain representation of its whiskers that essentially maps the location of the whisker barrels. If the whiskers are removed during a critical phase of neural development, the synaptic connections, which had developed initially, are not maintained and are permanently lost. It is the function of the neurons driven by sensory input from moving whiskers to maintain the appropriate connections, letting the superfluous connections die, and creating the beautifully precise brain mapping of the location of sensory input.

Likewise, in the visual system, its specificity and order depends on normal function of the brain, albeit not on sensory input. In the superior colliculus (SC), there is a "retinotopic map" of adjacent cells driven by receptor cells which are also adjacent in the retina. This spatial specificity develops in the rat before the eyes open and vision begins. In this system, the environment plays only a general role, maintaining development through glucose and oxygen which enable spontaneous activity before the eyes open—without visual stimulation. The specific environmental input is simply the fact that two receptors in the retina are next to each other. Two adjacent cells mutually affect each other and are more likely to fire together in space and time. Mutual stimulation leads to selective maintenance of projections to the SC from adjacent places in the retina. Spontaneous activity from retinal cells far apart do not mutually reinforce each other.

In sum, differences in neural structures are associated with past experience and differences in functional activity. Neural specificity is also likely in the development of attachment, and probably multiple sensory systems are involved to account for individual development. However, the neural substrates associated with specific behaviors and changes in behavior have not been identified. In the case presented, neural dysfunction at the stage of cell death may be pertinent to the expression of failed attachment. Obstructions of the natural process of cell death result in overproduction of neural material and inhibition of the synaptic rearrangements associated with neural development and change. Therapy may enable a recapitulation of the process of neural development which supercedes the failed attachment system.

An Invariant Presence

Fisher was certainly an invariant during multiple interactions and contexts over a long course of therapy, and it is likely that Fisher’s steadiness and "invariance" were important factors in the success of this treatment. It is striking that she first found an object for attachment that was more invariant than herself—a Coke machine. Like the invariant position of whiskers, or the invariant location of retinal cells, an invariant object may allow first overproduction of attempts at
MARTHA K. McCINTOCK

connecting—most would be inefficient and often inappropriate. Then the steadiness provided an opportunity for functional connections and ultimately change through pruning, the loss of dysfunctional connections. With Fisher, the child made a plethora of trips to that Coke machine, and had all kinds of interactions, some of which created a set of mutually reinforcing interactions at the neural level. A set of functional connections was maintained—the others were lost: dropped out in time. When a plethora of neuronal connections are made, one has the substrate to work with. But that is not enough: a functional appropriate attachment system may then come from discarding the nonfunctional connections, sculpting the attachment system. Fisher’s steadiness allowed the child to move from a relationship with the invariant object of the Coke machine to a relationship with the therapist, perhaps elaborating basic networks initially established through interactions with an object.

Time and the Life Span

The timing of Fisher’s treatment may also have accounted for the remarkable changes seen in this child. It occurred when he was between 6 and 10 years of age. This not only is an age when many neural structures are differentiating but is also a critical stage in the expression of sexual attachment, when children begin to recognize romantic objects and experience sexual attraction. Both heterosexual and gay young adults recalled that they were about 10 years of age when they experienced their first remembered sexual attraction. There was also no gender difference in this age, suggesting that the hormones sculpting neural differentiation at this age are of adrenal rather than gonadal origin. Indeed levels of DHEA, an adrenal hormone that enhances attention and alters neuronal function, is rising steadily beginning at age six and reaching the low adult rate by 10 years of age. Thus the hormonal environment characteristic of this age may have facilitated the development of a successful attachment system during therapy. Treatment earlier, or later, might have failed for lack of neuroendocrine regulation of neural development.

References


1 See Giedd et al. (1999).
2 See McClintock and Herdt (1996).

The Self-Organization and the Autonomy System

JUNE L. HADLEY

I am most grateful for Dr. Gedo's inspiration and encouragement of my work throughout the thirty-odd years we have known one another and collaborated in several capacities. Indeed, this essay is an outgrowth of some thoughts that I jotted down upon reading The Languages of Psychoanalysis (Gedo, 1996). Dr. Gedo was kind enough to comment on these notes, and urged me to pursue this work. I believe that the theoretical framework that John Gedo has developed throughout the years fits best with updated information on the functioning brain.

As I address the concept of the organization of overall functioning and identity which I regard as "self," I find as many definitions as I find psychoanalytic writers. Such reified words "tend to be imbued with a power of their own, and create pseudo-realities if one is not careful" (Basch, 1984, p. 37). The group of so-called self psychologists, who use "self" as both noun and adjective, has failed to relate the concept of self-functioning to underlying brain mechanisms, or to address the maturational and developmental origins of this functional concept. Indeed there has been a strong tendency to regard self-organization as a structure (the "self") rather than as a flexible, dynamic function, dependent on the orderly maturational sequence of neural mechanisms and the organization of, as I see it, six motivational systems.

Review of the Literature

Mahler, Pine, and Berman (1975) refer to a "process of self-definition," which comes close to my notion of integrated motivational systems. Daniel Stern (1985) devoted most of The Interpersonal World of the Infant to a psychological understanding of the development of the infant's "sense of self" and "self with other" experiences. He states: "A crucial term here is 'sense of,' as distinct from 'con-
cept of’ or ‘knowledge of’ or ‘awareness of’ a self or other. The emphasis is on the palpable experiential realities of substances, action, affect, and time. It is an experiential integration” (p. 71).

In distinguishing this point of view, Stern (1985) states:

In contrast to these more concrete and objective views, the present account has stressed the very early formation of sense of a core self and core other during the life period that other theories allot to prolonged self/other undifferentiation. Further, in the present view, experiences of being with an other are seen as active acts of integration, rather than as passive failures of differentiation. If we conceive of being-with experiences as the result of an active integration of a distinct self with a distinct other, how can we conceive of the subjective social sense of being with an other? It is now no longer a given, as it was in Mahler’s undifferentiated “dual-unity” [p. 101].

Stern goes on to describe his concept of RIGs, representations of interactions, generalized. These are lived experiences which are represented in memory as they are experienced repeatedly. This system emphasizes the crucial role of memory in the integration of the self-organization. He lists four requirements for an organized sense of a core self: self-agency, self-coherence, self-affectivity, and self-history.

These requirements or functions, addressed in a different focus, are close to the neurophysiological components which we describe as the self-organization. Stern (1985) pronounces the “death-knell” on symbiosis thusly: “Primary fusion was a pathomorphic, retrospective, secondary conceptualization” (p. 105). Although not using neurophysiological data to support his concepts, Stern definitely began to use brain functions such as memory and affect to explain more complex psychological functions. The one major correction to his formulations of 1985 is to rule out “amodal” perception and replace it with the more recently identified polymodal representations in convergence areas of the brain.

Several more recent authors’ works come even closer to describing psychological phenomena that can be supported by the biological functions, regarded as the substrate of self, which we are now able to observe. The perfection of the PET (positron emission tomography) scan, with its capacity to visualize the living, functioning brain, has made possible gigantic leaps in our knowledge of the normal brain performing psychological functions (Chugani and Phelps, 1986). The authors who have come closest to a fit between biology and psychology are those who have kept the brain and its functions prominently in mind.

The first author I consider is Joseph Lichtenberg, who made a major contribution to the understanding of motivation in Psychoanalysis and Motivation (Lichtenberg, 1989). He begins with a consideration of the concept of self which follows rather closely the format laid down by Stern (1985), with the same timetables of emergent, core, and subjective self-development. However, in
Lichtenberg’s later work (Lichtenberg, Lachmann, and Fosshage, 1992) and in the service of working out therapeutic technique, he reverts to the use of selfobject concepts akin to the self psychology paradigm. He says:

In the clinical situation, a selfobject experience implies the existence of mental contents forming an intact or restored, affectively invigorated sense of self; an affirming, like-minded, or idealized other (or a combination of those); and whatever else a dominant movitation calls for. A selfobject is not a reference to actual interpersonal relations or to the internalization of functions, but to an affect-laden enhanced self-state. And the specific relationships between self and affirming, like-minded, or idealized other—that of part self, part other—gains symbolic representation in the form of such fantasies and metaphoric expressions as being merged, twin(ned), or in an inspiring relationship with another [p. 134].

Thus Lichtenberg espouses self psychology clinically, although theoretically his concept of perceptual-affective-motor patterns is very similar to Stern’s RIGs and are a valuable description of what appears to be laid down by early experience in the infant.

Before embarking on the neurophysiological evidence supporting the concepts of self-representation and underlying the autonomy system, I would like to comment on the work of Fred Levin (1991), who has also contributed a vast amount of material correlating psychological function with the underlying neurophysiology. He describes psychologically meaningful developmental steps and relates these to the changing organization of the brain. These steps describe the appearance of an internal system for regulatory or so-called executive control, a subject that I focus on in this essay under the rubric of autonomy. For example, Levin notes that early on developmentally (but not limited to this period) the cerebellum helps maintain our felt sense of cohesiveness at the most basic levels of experience. Levin further says that our sense of self not only must include a perception of our body parts and their relationship to one another but also a concept of absolute space and our position within its coordinates. This information is coded within the cerebellum, has a very early onset, and seems crucial to the crystallization of an organization of self.

Levin (1985), citing the work of Frick and others, also notes that self-definitional functions tend to be properties of the vestibulocerebellar system (VCS). That is, the VCS is active in coordinating the hemispheres before the corpus callosum becomes myelinated, and therefore functional. It follows naturally that what psychoanalysts call the self, which involves self-definition, differentiation, and coordination (see also Gedo, 1989), in all likelihood requires an intact cerebellar database. In essence, the cerebellum handles ideas the same way it handles actions (Levin, 1985). Whatever happens during psychosis or fragmentation states would seem to involve at least some perturbation in the availability
of information from this cerebellar data base or within other core areas responsible for crossed sensory integration.

Levin stresses still another aspect of the cerebellum that suggests an important role in early self development. "There is reason to believe that within the cerebellum we create a model of the self-in-the-world and that our manipulation of thoughts about ourselves and others (i.e., our very thinking) at one time occurs by means of experimental manipulations or adjustments within the cerebellar model (Itoh, 1984, 1985). Without the cerebellar model to 'play with,' it is very likely that one would need actually to manipulate objects just to think about them!" (Levin, 1991, p. 196).

Levin quotes my speculation (Hadley, 1987) that the excessive orality and need to manipulate objects seen in the Kluver-Bucy syndrome (bilateral removal of the temporal lobes including the amygdalae) are probably "the operational equivalent of throwing the organism back from limbic or cortical control of behavior into 'cerebellar mode'" (p. 3). Recent positron emission tomography studies (PET) have indeed confirmed the importance of the participation of the cerebellum in normal cognition (Andreasen, 1997). Andreasen has been able to demonstrate a neural network linking the prefrontal cortex, thalamus, and cerebellum which is activated when humans process information, recall complex concepts, or interpret narrative material. It appears that the participation of the cerebellum is essential in all cognitive tasks. It has been observed to be abnormal in schizophrenic subjects who are attempting to carry out cognitive tasks.

Lastly, I make some comments on the ongoing work of John Gedo. In addition to his early hierarchical model, developed with Arnold Goldberg, he has accepted the notion of various motivational systems with the reservation that there might be more than Lichtenberg's original five (Gedo, personal communication, 1990). This present work based on my thinking, stimulated by Gedo's question of whether there might not be more than five motivational systems, suggests a sixth important element, the autonomy system. His view of self as a complex function is also most compatible with the neurophysiology of the self system as described herein. Gedo says: "[T]he formation of a stable self organization is equivalent to the integration into a single hierarchy of aims of the disparate biologically determined motivations of the infant. Henceforth, the maintenance of this macrostructure assumes a supraordinate role for the individual" (1996, p. 174).

In my conceptualization of the neurobiological process of self definition, several neural functions must unfold in an innate, genetically predetermined maturation (Table 1).

In what follows, I first trace the neurophysiological development of the autonomy system, then do the same for the organization of functions which we experience as an individual self.
Table 1  The timing of appearance of self-definition–related functions

<table>
<thead>
<tr>
<th>time:</th>
<th>birth</th>
<th>3 months</th>
<th>6 months</th>
<th>15–18 months</th>
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</thead>
<tbody>
<tr>
<td>function:</td>
<td>attention</td>
<td>affect &amp; memory</td>
<td>primary consciousness</td>
<td>self-reflexive consciousness &amp; maturation of autonomy system</td>
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The Autonomy System

Lichtenberg (1989) published a preliminary proposal for five distinct systems, each identifying a different set of human motivations. These systems mature and develop over time, taking on the representations of lived experience which shape the individual’s specific constellation of motivational propensities throughout the life span. These motivational categories refer to behavior that is physiologic homeostatic regulation, attachment/affiliative, exploratory/assertive, aversive, or sexual/sensual.

The neurobiology underlying these motivational systems suggested further modifications in the categorical delineations of the systems. These appear in my chapter (Hadley, 1989) on neurophysiology, as follows: (1) physiological, homeostatic regulation; (2) attachment/affiliative; (3) exploratory behavior with assertive and aversive outcomes of comparator mechanisms of currently experienced stimuli with stored memories; (4) sensual activity; (5) sexual activity. The latter two were considered distinct at that time but required further delineation in “The Instincts Revisited” (Hadley, 1992). Specifically, it seemed important to distinguish specific “sexual sensory receptors” from “ordinary sensory receptors,” based on quality and distribution, including the destinations in the cortex. In that work references to autonomy and self-representation were made repeatedly but were not formally organized.

One of the primary purposes of this essay is to propose another neurobiologically distinct motivational system devoted to the development and sustaining of autonomy. This system is closely related to the attachment system, a separate system in its own right, but frequently behaves reciprocally with the autonomy system. The neurophysiology section clarifies how this comes about functionally.

Furthermore, the autonomy system contributes heavily to the development of a cohesive self-system, which then operates as a supraordinate organizational system with the goal of maintenance of a cohesive self-representation as its overall function (superseding all other motivations, i.e., the six component motivational systems—homeostatic, attachment, autonomy, exploratory, sensual, sexual).
The Reticular Activating System and the Autonomy System

The development of the autonomy system is, as are all the motivational systems, dependent for its basic activation on the reticular activating system (RAS) and also, in some instances, on descending fibers in the same system for inhibition. This crucial system directs the specific actions of the overall autochthonous (internally generated, cyclical, spontaneous firing of cells in core generators) activity of the brain. All the brain's functional systems, including motivational systems, as well as specific focused attention, memory functions, and particularly the affect system, utilize the RAS for fine-tuning the entire overall organization of the discrete motivational systems as they are orchestrated into the supraordinate control system we regard as the self-system. The enormous amount of feedback that exists between the lower components of individual motivational systems and the frontal cortex (and back to individual systems) determines the outcome or summation of the activities which we view or experience as "self." The frontal cortices are largely responsible for the process of summation and arbitration of which information will be brought to consciousness and what will be acted upon. More elaboration on these functions are made in the final sections of this essay.1

The RAS is responsive to signals from all levels of the central nervous system, beginning with the brainstem into which it extends. The brainstem houses several sets of nuclei which produce neurochemicals that are essential for maintenance of the overall functioning of the RAS. Of these, dopamine (DA) appears most involved in "activation" (motoric functions); norephrine (NE) is more crucial for "arousal" (orienting and perceptual processing); and serotonin (5-HT, 5-Hydroxytryptamine) seems to exert a widespread tonic and inhibitory function. Serotonin is known to influence the threshold for neural responses and is crucial for screening out extraneous and superfluous stimuli, thus sharpening perceptual focusing.

The cerebellum is the first organizing structure in the neonate (Chugani and Phelps, 1986; Levin, 1991). The cerebellum receives sensory information from all modalities, but particularly from the proprioceptive and kinesthetic sensory systems. It is through these systems that the first sense of body is registered and located in space. This information is essential throughout life and continues to be activated when all higher cognitive functions are engaged (Andreasen, 1997). This representation of the body as a separate entity is the first building block in the emerging autonomy system. (A "representation" is not a concrete entity but a dynamic network of interconnected cells which share a propensity to fire in a synchronous fashion. When a portion of this cell assembly is activated, network properties appear, very much like the dynamic of a hologram.)

1 See also the essay by Levin, this volume.
Attention and the Development of the Autonomy System

One of the first definite assertions of autonomy (as distinct from exploration or simple aversion) is the very young infant’s removal of attentiveness (disengagement) from a human stimulus which is too close to the infant’s visual field or in any way intrusive, encroaching, or persistent. When intrusion is sufficiently strong, the infant may enter a state of complete disengagement of attention, or even withdraw into sleep. For mild intrusions, the infant can turn its head to disengage its gaze. If disengagement is frequent or prologed, however, it lays down patterns that will produce avoidance of human stimuli or at least attempts to minimize engagement generally.

The first mediators of focused attention are the colliculi (superior for visual, inferior for auditory) which are active at birth. These are rather complicated little structures which are layered with multiple input from different systems and resulting somatic and tonotopic maps. Such maps of the world within their small confines are particularly tuned to the distance receptors (vision and audition). As the infant matures, other areas come into play as directors of focused attention, but the colliculi continue to perform important attentional functions throughout life.

Two other mechanisms for regulation of attentive mechanisms become available with further maturation. First, the posterior attention system, which is primarily located in the parietal cortex, begins to control orienting by the age of four to six months. The ability to “disengage,” particularly from visual stimuli, becomes possible at this time.

It has been proposed (Posner and Rothbart, 1994) that the attentive regulation of stimuli (particularly visual stimuli) may serve as an early method of relieving the infant’s discomfort. This mechanism has been documented in infants as young as three months. Every mother has used this form of “distraction,” and there is evidence that the infant discovers this mechanism and utilizes it for self-soothing.

Somewhat later in the first year (at approximately 9 to 12 months), the higher level attentional system involving the anterior cingulate gyrus becomes functional, as evidenced by the infant’s ability to handle conflicting awareness (can reach for an object out of the line of regard).

Posner and his colleagues, who have done the most extensive research in the past three to four years using PET and functional MRI (magnetic resonance imaging) techniques, see attention implemented in the brain by networks of specific neural areas. These networks are anatomically separate from the primary processing areas which respond to sensory input. Attention is not considered a property of a single brain area nor of collective functioning of the entire brain (Posner, 1994; Posner, DiGirolamo, and Fernandez-Duque, 1997).

Attention involves three major functions: (1) orienting to sensory stimuli; (2) executive control (target detection and response selection); and (3) maintenance
of the alert state (Posner et al., 1997). Orienting is believed to be related to the posterior network system which includes the parietal lobes and pulvinar and superior colliculi. The executive network includes midline frontal areas (the anterior cingulate cortex in particular) and the basal ganglia. Maintenance of alertness is dependent on the norepinephrine system arising in the locus ceruleus in the midbrain. This system spreads to widespread frontal and parietal regions, more strongly on the right.

Memory Systems and the Development of a Personal History

The next stage of development is related to maturation of the limbic structures (amygdala, hippocampus, and their neighboring structures). In Figure 1, we noted the timing of the appearance of self-related functions. From roughly three to six months, the functions of affect and memory (episodic) secondary to long-term potentiation (LTP) come on line. In the latter half of the first year, we have the onset of conscious awareness or primary consciousness (Edelman, 1992).

To return to the first six months of life, the developing amygdala and hippocampus add important dimensions to the attentive functions. The hippocampus is particularly involved in the perception of novelty and with exploratory pursuit, which generate theta waves (at a frequency less than that of full wakeful processing but higher than resting alpha waves). The hippocampus, with its ability to habituate to stimuli and produce LTP, begins to record experience in its more permanent form (requiring manufacture of proteins which, in turn, lead to actual permanent structural changes in synaptic connectivity and function). Theta activity in the hippocampus disappears once habituation has occurred, indicating that its function is to diminish further, responding to stimuli that are no longer novel. Theta probably also serves to initiate some of the processes necessary to produce the cascade of events leading to LTP. The amygdala adds affective dimensions as new, and old memory traces are processed and compared. The amygdala also conducts environmental surveillance which can trigger orienting responses to motivational significance (potentially dangerous or rewarding) stimuli. The presence of such environmental stimuli produces a high level of alerting, causing electroencephalogram (EEG) desynchronization and the transmission of alerting messages to both hippocampus and the newly activated basal ganglia in preparation for action (internal or external).

The Development of Affect and Effectance Pleasure

The amygdalar and hippocampal systems account for still another component of the autonomy system, which manifests itself in the first two or three months of life. This function can probably best be called either problem solving or effectance motivation. This fascinating phenomenon, first described by Papousek (1969), can be routinely demonstrated in infants who are just beginning to have func-
tioning amygdalae. Papousek’s experimental design had infants arranged so that a turn of their heads to the left would turn on a light display. The infants learned this contingency rather quickly and then, just as quickly, lost interest. The light itself did not seem to be the rewarding experience but rather only served as evidence of the success of solving the problem of contingency. The experiment was then changed to require a right head turn to turn on the light. When the light no longer came on with a left turn, there ensued a period of greatly increased activity on the infant’s part to try to reinstate the former contingency. The infant would experiment with other movements until the right turn requirement was identified. After a few reproductions of the right-turn-light-on sequence, the repetition dropped to a low maintenance level (“just checking”) until a third contingency was required to turn on the light, namely, a left turn followed by a right turn of the head. Another sequence of high activity ensued until the infant discovered the proper action. The infants would glance at the light for confirmation of success, then often show overt signs of pleasure and even joy at success! This phenomenon is called “effectance pleasure” or “competence pleasure” in the infant research literature, and “pleasure in mastery” in the psychoanalytic literature. This pleasure serves as a powerful motivation throughout life unless the autonomy system becomes damaged through environmental misfortune.

The capacity to experience “effectance/competence/mastery pleasure” is clearly innate and functions automatically by direct access to pleasure centers even before the addition of the amygdalar-mediated pleasure component based on comparator mechanisms comes into play as a reward mechanism. Furthermore, this is not a learned function, because it does not follow the time pattern usually seen in random learning, but rather requires exercise in early infancy to guarantee its ongoing robustness throughout life.

The Beginnings of “Permanent” Memory

At about the third postnatal month, both amygdala and hippocampus are functional, ushering in the era of true affectivity and the beginnings of both episodic and presemantic memory. At this point representations become more complex and relatively more permanent (but still “plastic” to subsequent similar events), providing the growing infant a “history” of his/her own which forever remains relatively private and personal, no matter what the vicissitudes of social interactions superimpose on it. This is particularly true of holistic or so-called nonconscious (procedural) memory, where episodic memory is first encoded. Later in development, with the maturation of the left cortex and the advent of language (not necessarily speech but the recognition of categories and their names), semantic memory (verbally based) begins. The important distinction between episodic and semantic memory, in addition to the fact that the first is nonconscious and the latter is accessible to consciousness by voluntary recall, is that episodic memory is veridical to a much greater extent than semantic memory,
which can be distorted or “rearranged” to suit the situation or the expectations of significant others. In other words, conscious recallable memory can “lie,” whereas unconscious memory to all intents and purposes cannot. Conflict is frequently encountered between these two systems (episodic and semantic memory) and call for some form of defense to avoid the discomfort (anxiety) aroused by such a situation. Clearly, the topic of psychological defense warrants an essay all its own!

I do not deal with procedural memory in any depth except to note that the basal ganglia are crucial to its development and that the patterns of “how to do it” become a part of the total representation of the self-system. These procedural memories, after a period of practice, usually become automatic and are nonconscious and much faster and more efficient to initiate.

Anatomic and Cellular Aspects of Memory

I review some of the most important facts about the physiology of memory which need to be understood to appreciate fully how representations are built. Simple mechanisms of memory laid down at the synaptic level, such as habituation and sensitization, are present even before birth and appear to be inherent qualities of all neural synapses. These kinds of memory are more or less reversible as they are capable of extinction.

As limbic circuits mature, the onset of more elaborate forms of memory, incapable of extinction, becomes possible as a consequence of the formation of stable neural networks. Networks may weaken through disuse and may be overridden by subsequently laid down patterns, but for practical purposes, networks are indelible unless large areas of the brain are lost. Sometimes pathways necessary for recovery (recall) of the memory are destroyed or blocked (actively or passively), which gives the impression that a memory is lost; however, in such cases, the memory is securely locked in the brain but merely remains inaccessible to conscious recall. For example, procedural memories may be accessed through priming (sensory input), but the person is unaware of their presence or how that competence arose. That is, they have no memory of the learning process.

Certain portions of the amygdala mature shortly after birth and have direct connections between thalamus and amygdala (rather than the later maturing pathway from sensory cortex to thalamus to amygdala and back to cortex, usually by way of the thalamus). This early “short-circuit” functions to process emergency data such as rapidly approaching objects or other alarming or potentially dangerous stimuli (LeDoux, 1992). This rapid-firing early learning system with its memory functions is particularly indelible. It is thought to be laid down in fragmentary, sensory codes of the kind I associate with the “somatic memories” observed in victims of early trauma, as in infants and children. As the remainder of the amygdala matures, it continues to function as the mediator of emotional memory and is dissociable from the memory systems of the hippocampus.
(Joseph, 1996). Indeed the hippocampal processing may be viewed as a "knowledge" system, whereas the amygdala systems are closer to a "belief system." Furthermore it is now known that, when stimulus strength and arousal reach a sufficient intensity, the hippocampal system shuts down (rather than working in parallel with the amygdala) and only "emotional memory" is laid down. This precludes the formation of usual declarative, recallable memory, and more often than not causes exclusion from conscious access. When patients say that they have no memory for early traumatic events, it is an accurate statement as far as they know, because only the amygdala-mediated "emotional memory" has been laid down. These have to be accessed by other procedures than voluntary recall.

The Molecular Biology of Memory

To return to the cellular and chemical mechanisms of memory, we need to understand both how cells and synapses are altered by experience, as well as how cells are connected into networks and networks coordinated into extensive representations. I begin with a cursory overview of the neurochemistry of synaptic transmission, and the mechanisms of LTP as it occurs in the hippocampus and amygdala. (LTP occurs most surely in the cortex as well, though more slowly, sometimes requiring as long as three years to be firmly anchored.) The most prevalent excitatory neurotransmitter is glutamate (an amino acid) assisted by glycine (another amino acid). Glutamate is the chemical most often associated with perception and permanent alteration of synaptic function, thereby linking cells together into networks. The glutamate molecules are secreted by the presynaptic cell into the synaptic cleft and attach themselves to receptors on the postsynaptic cellular surface. There are many types of postsynaptic cell receptors, but the ones that are currently considered crucial to plastic changes in the postsynaptic cell are the NMDA (N-methyl D-aspartate) subgroup of glutamate receptors. Stimulation of NMDA receptors allows a great influx of CA++ ions, which leads to a cascade of metabolic processes within the postsynaptic cell. This cascade triggers gene expression and the manufacture of NCAM (neural cell adhesion molecules)-related proteins necessary for the changes in cell morphology (e.g., elaboration of synaptic structure, building of new synapses, etc.). It also makes excitation more likely on the next occasion of stimulation.

Non-NMDA glutamate receptors continue to record stimuli without changes secondary to usage. In other words, in contrast to NMDA receptors they are not plastic in their function (do not undergo structural changes with usage). The same mechanisms are apparently employed in the mediation of LTP, which were used in the formation and differentiation of structure in the developing brain. This is a particularly beautiful example of the parsimony of mechanisms in living systems (Bailey and Kandel, 1994).
Another recently identified mechanism of reinforcement of presynaptic functioning in the synapse is the secretion of NO (nitric oxide, a diffusible gas) from the postsynaptic cell which spreads readily and rapidly to adjacent tissues, including the presynaptic cell. NO only reinforces those synaptic structures that have been recently activated, thereby selectively marking only those cellular structures. The combination of the several devices reviewed in this section is currently believed to be the necessary process for forming the basic component of neuronal networks.

Linkages of Cell Networks and the Concept of "Binding"

Many cell networks are created in each of the sensory modalities stimulated by an experiential event. But the question remains: How are these various networks, scattered throughout the brain, joined together to form a complete representation of an experiential event? This is the issue of "binding," which has recently received the attention of many neuroscientists. Karl Pribram (1995) has recently summarized the most probable theory of a binding process.

Pribram's answer to the question of how wide-ranging network activity in the brain gets synchronized into a unitary experience hinges on information that a 40 HZ (Hertz) rhythm is generated in the intralaminar nuclei of the thalamus. This wave sweeps from frontal cortex each 12–15 milliseconds and creates synchrony in the entire network of cells involved in a given representation, no matter how widely distributed they are. The origin of the cellular generator is the perirhinal cortex, a structure at the very core of the comparator mechanism discussed earlier under the rubric of hippocampal and amygdalar systems. Note as well that the perirhinal cortex itself borders the hippocampus. The selection of elements to be simultaneously activated as a unit appears to be dependent on processes in the amygdala and its associated frontal cortical areas. In other words a system involving the perirhinal cortex, the amygdala, the frontal cortex, and their connections seems to be essential for (1) the experience of consciousness, (2) the maintenance of overall cohesiveness, and (3) coordination of mental functioning. Higher level consciousness, which develops in a later period of time, is discussed in more detail.2

Behavioral Evidence for the Functions of the Autonomy System

Now that I have established the importance and chronology of memory in the creation and maintenance of a stable history, it becomes possible to examine some of the manifestations of autonomy from the same developmental period. With the concurrent maturation of the basal ganglia, which makes possible

2 In this volume, Levin discusses consciousness in terms of an executive control network.
smoother and more direct motor functioning, the infant not only withdraws attention in the face of intrusion, but actively motorically resists encroachment. Mahler and colleagues (1975) called attention to the fact that an infant of four to five months of age will vehemently motorically resist the intrusion of a "parasitic" parent in order to keep some space between itself and the caretaker. It seems to me this is comparable to the autonomy seen when the neonate uses his/her attentional system for the same purpose. Also, if allowed, by the age of four months, the infant will lead the dyad at least half the time and apparently enjoy this assertiveness.

The autonomy and the attachment systems are intimately related. Operative at birth in rudimentary form, they probably have some primitive memory from intrauterine experience in terms of familiar action patterns of the infant's own movements, as well as familiarity with the mother's voice and cyclical activity patterns, and so on. In the earliest stages of development, it appears that the attachment and autonomy systems record experience (separateness and togetherness) in parallel, but as maturation progresses these systems segregate information along the lines of "aloneness" (to the autonomy system) and "togetherness" (to the attachment system). There are undoubtedly system overlaps in such representations. The distinction of the two assignments of experience to either system probably depends largely on the deployment of the attention mechanisms either inward (autonomy system) or outward (attachment system). That attention cannot be simultaneously focused inward and outward parsimoniously accounts for the flexible reciprocity of the two systems.

As experience is accumulated, inner representations remain fairly well balanced between the autonomy and the attachment systems, that is, providing interactions with caregivers are optimal. If, however, in the case of nonoptimal caregiving, either the autonomy or the attachment systems are used preferentially. This pattern can become dominant as an expression of the individual's preferred mode of functioning. Possible outcomes run a continuum from total self-absorption, through various interactions of both systems, to the extreme of object attachment, so-called "symbiosis," in which virtually all autonomy is essentially surrendered (merger).

In such a state of merger, object representations are imbedded in the self-schema with consequent loss of boundaries. The "will" is projected to the "other," and action is dependent on the ability of the infant to read the wishes of the "other" and carry them out. In this scenario, the infant may experience his/her locus of control as outside itself, and in extreme cases the infant may totally lose awareness of autonomy or internal power.

At the time of maturation of both right and left frontal cortices, as well as the anterior cingulate gyrus (Posner, 1994; Posner et al., 1997; also see Levin, this volume), when these cortical mechanisms contribute more decisively to executive control (attention) processes, behavior becomes less flexible and habitual
patterns relatively more "hard wired." Hopefully the "mother" has offered the infant a well-balanced experience of separateness and togetherness, which can be mutually satisfying and leave behind a healthy substrate for future functioning.

The next dramatic maturational shift occurs when the maturation of the frontal cortices adds several new competencies: (1) for enhanced self-reflexive awareness; (2) for recall, with awareness, of absent objects; (3) the capacity to hold recent events in working memory (dependent on reverberating circuits in the frontal cortical assembly) for comparison with other representations; (4) the ability to predict future events from past memory; and (5) an expansive exuberance which feels to most observers like a real "celebration of life." These developments lend a special excitement to the infant of 12 to 15 months, suggesting that development and maturation are interacting efficiently with striking effects.

This exuberant "practicing" stage (Mahler et al., 1975) is supported physiologically by the maturation of the right orbitofrontal cortex, which matures ahead of the left hemisphere. Schore (1994) has done a magnificent job of explaining how the differential maturation of the two major systems of frontal cortex and the two hemispheres interact to produce both the "practicing" and "rapprochement" periods of infant development. He explains that the orbitofrontal "system" includes the orbitofrontal cortex, the ventrolateral caudate nucleus, the centromedial nucleus of the hypothalamus, and the septal nuclei. These structures form a "permissive" system which requires the indulgence of a proud mother. The practicing stage in the infant's life is usually the last time when unbridled exuberance feels permissible. Soon after this supremely autonomous era, the left dorsolateral frontal cortex begins its inevitable maturation with its contribution of primarily inhibitory functions. The dorsolateral "system" includes that area of the frontal cortex, the anterodorsal caudate nucleus, the lateral pallidum, the subthalamic nucleus, and the hippocampus.

When maturation of the dorsolateral system, which is also closely affiliated with the locus ceruleus and noradrenergic dominance, begins to manifest its inhibitory functions, the formerly unrestrained self-organization experiences great upheaval. At the same time, the parental, particularly the paternal influence, begins to set limits and restrict the child's behavior. The latter development usually leads to monumental power struggles in the infant, both internal and external. During this time, the attachment and autonomy systems are at all-out war. Just as the unbridled exuberance of the previous period was a lifetime "high," the ensuing inhibition is probably the cruelest challenge of a lifetime to the developing autonomy system.

The outcome of the infant's and parents' negotiation of this crucial developmental period has profound effects on the child's future adaptation to his/her social environment. The two extremes of the continuum of possible outcomes would appear to be the development of ideals and imperatives (with a persis-
tence of activities motivated predominantly by the infant's independent volition) versus an almost total dependency upon attachment figures.

The absolute necessity for the parents to take advantage of the maturation of the child's left dorsolateral frontal cortical inhibitory system to instill social restraint is clear, but, at the same time, children should not be shamed or intimidated into the wholesale abandonment of their natural autonomy. It is a miracle that parents and children survive this period, only to have to repeat the process again as parents and bigger, stronger, more aggressive (but seldom wiser) adolescents.

A final word about the role of the autonomy system. Creativity cannot occur without autonomy in the sense that the exploratory system is essential for the initiation of any activity, and assertiveness is necessary for carrying it through into action. The sensual system also adds content to creative activity, but the most essential component is really the contribution of the autonomy system in producing acts of self-expression. These acts would appear to be a mature form of the infant's propensity to "make things happen," and they express the satisfaction and pleasure derived from such self-initiation.

The Organization of Self-Cohesion

I have now traced the maturation of the brain and its contributions to the developing separate motivational systems and their interactions with one another and the environment. These components are shaped by experience and maintained in relatively stable patterns mediated by memory, so that they work together either in harmony or in conflict. When conflicts arise, they are resolved for better or worse through compromises that are called defenses which essentially minimize the experience of discomfort (anxiety).

The overall system is organized to maintain an optimal level of activation (neither manic nor depressed) and to maintain enough harmony among the motivational systems for smooth functioning without undue discomfort. This also ensures an optimum level of familiarity of patterning, resulting in a sense of continuity. These patterns express both those defenses characteristically used, as well as the idiosyncratic relationships between motivational systems.

The importance of personalized patterning is captured by Penrose (1994) when he says, "Thus, matter itself is nebulous and transient; and it is not at all unreasonable to suppose that the persistence of 'self' might have more to do with the preservation of pattern than of actual material particles" (p. 14).

The representations developed and maintained by memory are distributed neural networks which are activated in widespread areas of the brain by sweeping waves generated in the perirhinal cortex (temporal limbic), with distinctive "flavors" added by the amygdala and its frontal cortical projections. The frontal cortices (both right and left), with the anterior cingulate cortex, operate as "senior
executives” within the executive control network of the brain, once they begin to mature at about 10 to 12 months of age. They are most intimately associated with the amygdala and hippocampus and are regarded as “limbic cortex.”

Their ability to alter so many of the functions of the brain lies in their ability to influence attentive processes both excitatory and inhibitory. The frontal and anterior cingulate cortices are also the “keepers of consciousness” insofar as they direct which information can be routed to the left cerebral hemisphere and then remain activated for a minimum of 500 milliseconds, which are two of the necessary conditions for conscious awareness (Libet et al., 1979).

The right hemisphere is more powerful in evoking attentiveness in both hemispheres than the left, which is only able to respond to unilateral stimulation. Right parietal activation is sustained much longer than left, and injury to the right parietal lobe is considered the substrate for unilateral “neglect” syndrome which is due to lack of attentiveness to the “neglected” side. This neglect may cause the disappearance of any awareness of the left side of visual images or, in the extreme, eradicate any awareness of the existence of the left side of the body. This is a good example of how attentiveness is essential in the mediation of a total perception of self-organization. After all, in our definition of “self,” the ability to distinguish the characteristics of “me” from all others is basically a cognitive skill, a function, not a structure (Gedo, 1997, personal communication; 1993, 1996).

The reification of “self” as a noun probably has its origin in the use of language for purposes of communication. As Joseph (1996) points out: “Via language one may form an abstraction of one’s sense of Self so that it may be scrutinized from multiple verbal perspectives as well as modified or even disguised in accordance with an idealized self-concept” (p. 564). The risks of misunderstanding the word, if it is not very carefully defined, are innumerable, and we must be careful when we use the concept of self to define it in its functional sense to be strictly correct.

The disruption of the overall unity of self-experience is the most dreaded of all experiences humans can suffer. There seems to be a primitive awareness of what this sensation would involve, and one wonders if this is a state that infants suffer transiently before there is sufficient organization of brain function to prevent such a condition. The sensation reported by adults is one of disintegration, “falling apart,” annihilation, total panic, or utter disorganization of both body and mind. The threat of disorganization posed by highly terrifying events or even a loss of sufficient familiarity (and therefore predictability) in experiential events can produce this dreaded sensation. Without prior experience to guide the individual, there is a sense of utter and overwhelming helplessness.

Now that we have established a neurophysiologic substrate for the systems for autonomy and a basis for self-cohesion, we can look forward to an exploration of conscious and nonconscious mental processes.
It will probably come as no great surprise that the structures necessary and sufficient for conscious mental processing are the same structures essential for maintaining the cohesion of the self-system with a few further conditions and provisions. It is amazing how these two systems (conscious processing and self-cohesion) interact in concert.

So consciousness as a noun loses much of its mystery and becomes instead a function of an exceedingly complex, evolved brain, functioning at its highest cortical levels.

With the proliferation of imaging techniques (PET and MRI, for instance) and the enormous amount of experimental data, it is indeed an exciting time to be exploring the correlations between neural functions and the mind they create.

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Learning, Development, and Psychopathology
Applying Chaos Theory to Psychoanalysis

FRED M. LEVIN

Nothing in nature is random . . . A thing appears random only through the incompleteness of our knowledge.

—Spinoza

Our job is not to penetrate . . . the essence of things, the meaning of which we . . . [cannot perfectly] know anyway, but rather to develop concepts which allow us to talk in a productive way about phenomena in nature.

—Niels Bohr

This essay considers how best to apply chaos theory to psychoanalysis. The increasing number of publications on this challenging subject requires some exegesis that is understandable by individuals not trained specifically in mathematics.

Levenson (1994) is quite skeptical that anything useful for psychoanalysis will ever come from chaos theory. However, others strongly disagree and see a great potential for chaos theory to benefit our field. In the United States, Galatzer-Levy (1978, 1995, 1997) and Moran (1991) describe the utility of chaos theory in explicating development, quantitative to qualitative shifts, and the importance of recognizing fractal-like signatures in psychoanalytic clinical material. Levin (1996a, 1997a, b) believes chaos theory offers a unique vocabulary and perspective which might further our understanding of learning, development, and psychopathology. Forrest (1991a, b, 1995, 1996a, b) explores the boundary of

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An earlier version of this essay was presented as the discussion of Robert Galatzer-Levy’s lecture on chaos theory to the Chicago Psychoanalytic Society, October 28, 1997 (Galatzer-Levy, 1997).
Learning, Development, and Psychopathology

psychoanalysis, artificial intelligence, and chaos theory, finding much that can be positively applied to developmental psychology and psychopathology. Gleick (1987), Moran (1991), and Spruiell (1993) explain chaos theory, raising a broad range of theoretical issues. Sashin (1985) and Sashin and Callahan (1990) demonstrate stunning mathematical results,\(^1\) employing unique affective response models. And Moran (1991) and Galatzer-Levy (1995, 1997) have each made integrations, the most important of which appears to be the idea that *psychoanalytic process reduces psychopathology by adding complexity to mental functioning.* In this regard, Palombo (1998), writing about *coevolution,\(^2\) sees dreaming as “the edge of chaos” (p. 261), resulting in learning as the adaptive reorganization of memory.

Outside this country essays on chaos and psychoanalysis have appeared in France (Quinodoz, 1997), Israel (Priel and Schreiber, 1994), and South America (Matte-Blanco, 1986, 1989).\(^3\) These significantly add to our knowledge of what chaos the phenomenon might be accomplishing, and seem to comprise two related notions: that chaos facilitates learning by means of symmetry breaking (elaborated on below), and that chaos plays a role in transference as well (Levin, 1996a, 1997a; Priel and Schreiber, 1994).

In what follows I wish to clarify what appears salient in the oeuvre on chaos theory, so that readers can better form their own opinions about such matters. Let us begin with a discussion of the idea that chaos theory offers a descriptive vocabulary for and a better way of framing psychological development.

Development

In discussing developmental theories, Galatzer-Levy (1997) critiques the idea that proper development in children essentially correlates with reaching age-typical norms. Paraphrasing Anna Freud, he notes that when development is progressing, even if it deviates from the norm, the child has nevertheless engaged the major psychological task of childhood. Yet, we may ask, if individuals follow different pathways, then what exactly is normative about development and how are we to understand variations in the process?\(^4\) It seems clear that we

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\(^{1}\) These results appear in a superb article in *The Annual of Psychoanalysis* (1990).

\(^{2}\) Utilizing Stuart Kauffman’s ideas about self-organization, Palombo has written brilliantly on applying evolutionary theory to the mind/brain to understand what happens in ego development or in psychoanalysis.

\(^{3}\) Matte-Blanco’s work is explained to some extent later in this essay, especially that part most relevant to chaos theory.

\(^{4}\) In his concept of “Neural Darwinism,” Edelman (1987) sees development as a stochastic process that involves complex interactions and communications between migrating and functioning brain cells, surviving and dying brain cells, and the very processes that these cells subserve. Through massive connectedness (what Edelman calls reentry) mind/brain systems create “values.” Ultimately, the process is adaptive, warm blooded and biologic, not cold and machinelike.
have too many developmental theories and too little agreement among them to reliably answer such questions. Moreover, each of the current coterie of developmental theories cannot be correct because their assumptions are different and mutually exclusive.

Such are the difficulties in improving the situation of finding an overarching theory of development. Eventually it would be nice to create a developmental model that builds itself up from basic starting conditions. At present no psychoanalytic model of development strictly meets this requirement, although Gedo’s hierarchical model comes quite close. Yet this is where chaos theory appears to offer something useful to psychoanalysis because chaos theory shows a robust capacity to portray the evolution of systems, making it a natural candidate for solving the modeling problem. My meaning here will become clearer shortly when I describe the Feigenbaum Diagram and touch on so-called attractors.

Chaos theory is an outgrowth of work early in this century by Poincaré (1916–1954), and in more modern times by René Thom (1975). The terms fractal and chaos were coined in 1971. The advent of the modern desktop computer is the decisive discovery which permitted widespread experimentation with complex chaotic systems and thus the accurate solution to otherwise intractable problems in differential equations.\footnote{Some problems in mathematics, especially differential calculus, according to Galatzer-Levy, were once solved only by approximation, or not solved at all because of the difficulty factor. After chaos theory was invented and applied to calculus, however, it became possible for the first time to find real solutions to some of these intractable problems. In the process of using computers to model such solutions, amazing pictures also emerged of highly suggestive phenomena that underlie complex behavior within mathematical systems. These phenomena are the subject of the latter parts of this essay.}

**Chaos Illustrated: The Feigenbaum Diagram**

The core idea of chaos theory can be demonstrated most simply by reference to the Feigenbaum diagram (see Figure 1), which represents the graphing of an equation, called the quadratic iterator,\footnote{In other words, values of \( x \) are computed using the formula. Each value is computed by subtracting the previous value of \( x \) from the number 1 and multiplying that number by the number \( a \) (and also by the previous value of \( x \)). In the series, the calculations of \( x \) start with \( x = 0 \) and continue for an extremely large number of iterations. The Feigenbaum Diagram graphs these values on the vertical axis, with sequential values of the variable \( a \) moving from left to right along the \( x \) or horizontal axis. As this happens a most remarkable pattern appears that no one anticipated before computers made these calculations and graphs with exquisite precision.} which reads as follows: \( x_{n+1} = ax_n(1-x_n) \), where \( n = 0,1,2, \ldots \). In Figure 1 the various values of the left side of the equation appear on the \( y \)-axis, while the \( x \)-axis denotes time (that is, the number of iterations). For values of \( a \) below 2, the value of \( x_{n+1} \) slowly increases. For values of \( a \) between 2 and 3, the value of \( x_{n+1} \) bounces back and forth between...
Figure 1. Self-similarity in the Feigenbaum Diagram. This is a copy of Figure 11.3, page 589, from Chaos and Fractals: New Frontiers in Science, by H. O. Peitgen, H. Jürgens, and D. Saupe (New York: Springer-Verlag, 1992). Reprinted with permission of the publisher.
two relatively fixed values. But if \( a \) is larger than 3, especially as it approaches 3.5699456 \ldots, then \( x_{n+1} \) begins to fluctuate first between 2 values, then 4 values, and so on in a cascade of rapid doubling (also called bifurcation). Such rapid doubling of the value of \( x_{n+1} \) is, by definition, the onset of mathematical chaos.

The onset of chaos always occurs at a point (along the \( x \) or horizontal axis) of 3.5699456 \ldots which is now known as the Feigenbaum point. Moreover, each interval of doubling, divided by the subsequent interval of doubling, is also a constant, 4.669206 \ldots which is known as the Feigenbaum number (sigma). In other words, rapid doubling (chaos’s onset) occurs 4.6692016 \ldots times faster with each doubling event.\(^7\)

What is most interesting, however, is that each of these numbers (the Feigenbaum number and point) are constants in nature, such as \( \pi \) (3.14159 \ldots), or \( e \) the base of natural logarithms. Whether \( x \) is the rate of firing of a brain cell, or water dripping from a sink, or an oscillation in a electromechanical system, the graphing of chaos in nature always produces exactly the same Feigenbaum diagram, characterized by the Feigenbaum point at chaos’s onset and the Feigenbaum number relating to the rapid acceleration of periods of doubling!

Now another unexpected finding: If any portion of the chaotic pattern of the Feigenbaum diagram would be enlarged, it will reproduce the pattern of the original Feigenbaum diagram! This can be repeated as many times as one likes, always with the same result, and it represents the so-called fractal\(^8\) quality of non-linear dynamical systems.

**Applying Mathematics to Psychoanalysis**

A brief word about the history of attempts to bridge psychoanalysis and mathematics seems in order. The pioneer modern psychoanalyst polymaths are Robert Galatzer-Levy and the late Jerry Sashin (who died in 1990 before he could complete his important contributions).

Let me quote briefly from Jerry Sashin to further explain our subject and also introduce the relation of chaos theory to neuroscience:

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\(^7\) This means that as we move to the right in the Feigenbaum diagram, once chaotic or rapid doubling has started, each doubling occurs more than four times faster than the time the previous doubling required. This is what produces the sensational cascading pattern.

\(^8\) One commonly known fractal is the snowflake, which has the shape of a six-pointed star when looked at grossly. Under the microscope, however, the six-pointed shape appears to be a fundamental unit from which the entire snowflake is made. That is, no matter how many magnifications, we continue to see six-pointed shapes as the essential components from which larger elements of the snowflake are composed.
Catastrophe theory models form a bridge between the psychology and the corresponding neurology. I'll try to explain how. When you study the dynamics of systems involving oscillators, you discover that coupled oscillators show behaviors which are described (modeled) by catastrophe theory models. What this suggests (since many localized regions of the brain can be characterized as oscillators) is that... affect-response is determined neurologically by [the following]: the coupling of the regions of the brain having to do with fantasizing, with language, with containment\(^9\) [meaning the container function] and [with] emotion. Since emotion is probably in the limbic-hypothalamic region, [visual] fantasizing... the occipital area, language... the left [hemispheric] cortex, and containment... the prefrontal region (all of this being greatly oversimplified and now out-date [of course]), what we are dealing with is not just linkage between left and right [hemispheres] as proposed by Sifneos, Hoppe and others, but also up/down (cortical/limbic [cerebellar]) and anterior/posterior linkage as well\(^10\) (personal communication).

In this early phase of his work, Sashin pursued his research at René Thom's institute in Paris, Thom being one of the guiding geniuses behind chaos theory.

**Development and Growth: The Edge of Chaos**

Galatzer-Levy's (1997) core idea is that the mind is a complex system on the edge of chaos, that is, with sudden lurches of change rather than smooth progression. A good example of such change, outside of the realm of psychology, will help the reader understand better what is intended here, that is, the surprises that lurk within changes.

Consider the seemingly simple subject of how humans grow in height. Medical schools teach that height growth is continuous, that is, a smooth curve; many of us remember the smooth growth curves for infants and children in texts and

\(^9\) This containment parameter may be decisive for the outcome of successful development because the ability to contain (i.e., manage affect or self soothe) is a requirement for successful adaptation generally. Further comments are made on this container function at the end of this essay, where Sashin and Callahan's 1990 work is elaborated on.

\(^10\) At the same time that Sashin worked with René Thom, Professor Utena of Tokyo University was pursuing his so-called Kabuki model, named after the movable stage in Kabuki plays. Utena's model, just as Sashin's model, is described by its originator in terms of the brain's connectivity running in all directions (see quoted personal communication from Sashin), not just integrating left with right hemisphere, and this complexity is understood by each to be critical for the integration of cognition and emotions. It should be noted, however, in spite of the similarities noted, that the difference between these two models is that Sashin's was a chaos theory model, whereas Utena's was not specifically related to chaos theory. In spite of this difference, I believe it is important to mention Utena's model in this instance to remind the psychoanalytic reader that the work on chaos theory (of Sashin), like the Kabuki model (of Utena), was an attempt to understand mind/brain functioning so that this understanding could be applied to improve our psychoanalytic theory of learning.
hospital charts. This is all well and good, except we now know that this view of smooth linear growth in height is now understand to be completely wrong!

In reality, human beings spend most of their youthful lives, over 99 percent of it, not growing at all! What happens, rather, is that possibly one evening a month there are massive lurches of growth (i.e., spurts) during which all of the growth occurs for that month. Such growth spurts represent a very small percentage of the overall time of one’s life, in between which there is actually zero growth.

The subject of growth is important to this discussion because, as we saw in the Feigenbaum diagram, chaos theory is robust in its ability to mathematically describe developmental patterns, such as the growth of trees, snowflakes, brains, or minds, and it can do so with accuracy and beauty. Interestingly many such processes involve the repetition of self-similar patterns at decreasing scale (cf., fractal geometry), which it turns out can be expertly modeled with computers.

Galatzer-Levy (1997) further suggests that when analysts observe in their patients sudden dramatic episodes of psychological growth, we should not be too quick to dismiss these as events of unlikely or exaggerated significance. For example, he describes the case of a Mrs. R, a woman who changed suddenly and dramatically around the time of seeing a particular movie scene, that is, in response to only very slight changes in her ordinary mental state (initial conditions). Here Galatzer-Levy chooses his words very carefully in order to introduce an apparent isomorphism between chaos theory and psychoanalysis,

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11 In other words, that such changes are too quick to indicate real or significant psychological development.

12 By making reference to the effects of slight changes in initial conditions, I am not arguing that when this is observed in and of itself it means that the system being considered is proven to be chaotic. Rather I am reasoning that because chaotic systems are invariably sensitive to such initial conditions, the appearance of this quality requires one to at least consider the possibility that one is observing the effect of a chaotic system. This may appear to be a subtle distinction, but it is important for readers to appreciate this orientation, so that they remain open to the main arguments of this essay, which are intended to introduce chaos theory, familiarize the reader with some of its characteristics, and thus enable the reader to follow the arguments and clinical examples so as to better appreciate the exciting interest within some circles of psychoanalysis in applying chaos theory to psychoanalytic theorizing.

13 I would like to emphasize that I am not asserting that the repetition of patterns with fractal-like qualities does not automatically imply the existence of chaotic systems. It is obvious that such behavior could simply reveal lawfulness without any reference to an underlying chaotic behavior. However, it seems reasonable to wonder, as does Galatzer-Levy in all of his publications on chaos theory and psychoanalysis, that at least some of these self-similar patterns of behavior (appearing on differing time scales) within psychoanalysis might reflect a deep process within mind/brain that is operating within a chaotic system. It would be foolish to ignore this possibility. In fact, this is why so many scholars of psychoanalysis have begun to examine the area of chaos theory to see what payoffs might be won for our field by considering carefully such possibilities and pursuing them thoroughly.
namely, the potential in each domain for small changes in initial conditions to profoundly affect the outcome of complex systems, what in chaos theory is called the so-called “butterfly effect.”

An example of such sensitivity to initial conditions has already been presented, in fact, in the case of the Feigenbaum diagram, which as you remember, is dependent on the fact that changing the initial value of $a$ only slightly in our equation resulted in radically different outcomes, only one of which led to the onset of chaos, characterized by periods of rapid doubling.

Let us consider as a second example of rapid change, a clinical vignette taken from an article by Wolf (1990) to illustrate this same sensitivity to initial conditions, but this time within a clinical psychoanalysis. Wolf indicates that Franz Alexander was very frustrated with a certain male patient, who seemed narcissistically entitled. One day the patient came into Alexander’s office with mud caked on his feet and dirtied the analytic couch. Alexander screamed at his patient to get his feet off the couch, which proved to be the decisive moment in this young man’s treatment, after which things really improved!

Alexander attempted to understand what had happened by examining the changes in initial conditions between usual sessions with the patient and this particular occasion: The analysand’s father had always indulged him, but now his analyst, in a father transference, was not indulging him. However, what was more interesting was that this time the angry analyst-as-father was nevertheless seen by the patient as remaining essentially on the patient’s side. Alexander felt that it was the patient’s experience of this discrepancy between the image of the historical father and the image of the person of the analyst (especially around how they each handled really frustrating situations) that led to insight and sudden, unexpected growth.

Although we would all surely differ over what actually changed in Alexander, his patient, or their analytic work that allowed the patient to finally see Alexander as a good but angry father figure, we might nevertheless agree that we are very much in need of a productive way of communicating about the phenomenon of such change, especially as occurred in this case. Chaos theory offers a special terminology for communicating about change; it also offers a unique way of thinking about the conditions associated with change, that is, in describing initial conditions in a systematic way.

14 The so-called butterfly effect suggests that the added presence of a single butterfly somewhere in the world, say Japan, can be shown to have ramifying effects on the weather in a place completely around the globe, say Chicago!

15 It may help some to emphasize that the discussed influence of initial conditions need not imply particular outcomes. I am merely arguing that it is worth speculating that some psychological systems are characterized by a sensitivity to initial conditions and thus are chaotic systems. This means that some psychological systems may turn out to be governed by chaotic mechanisms, although this clearly remains to be proven. However, without some limited and useful speculation, it is not possible to advance any field.
For example, chaos theory allows one to talk of such things as transitions into chaos, where the time intervals of doubling shorten according to a determined rate (for example, $1/\text{Feigenbaum's constant}$) and where the emerging patterns demonstrate a beautiful orderliness, as seen in the Feigenbaum diagram (and a related figure, the so-called Mandelbrot\textsuperscript{16} set).

What makes these factors relevant to psychoanalysis is the notion that, arguably, each of our patients shows a consistent signature in their pattern of being (Galatzer-Levy, 1997). One could argue that this signature is fractal-like in that it reappears at various levels of "magnification" in the patient's behavior and thinking. In other words, such patterns of thinking or associating can be observed in the patient's grossest behaviors over years of time, or seen to emerge repeatedly over different time scales: months or weeks or even over minutes in a single session.

Chaos theory further allows one to actually quantify the amount of chaos in a given system.\textsuperscript{17} Finally, there are so-called strange attractors which are specifically what depicts the exact temporal and spatial trajectory of chaos. Let me explain attractors further.

Attractors in general are "\ldots geometric forms that describe the long-term behavior of \ldots [nonlinear] systems" (Priel and Schreiber, 1994, p. 214), that is, systems where the output is not proportional to the input.\textsuperscript{18} More specifically, "\ldots an attractor is what the behaviour of the system settles down to, or is [conceived of being] attracted to \ldots" (p. 214), such as a pendulum's movement over time toward a fixed point of rest. This rest point is described as a simple attractor because it is as though the single simple rest point "attracts" the pendulum. Limit cycles are a second intermediate type of attractor; these have trajectories that reach, as a limit, the contour of a closed loop, that is, they do not settle down to a simple point but rather to a loop. An example of such a limit cycle would be the repetitive movement of a clock pendulum following a more or less constant loop trajectory, without slowing down from friction because the system has an external source of power. Finally, there are strange attractors which show the most complex (and interesting) trajectories of all, such as are seen in chaotic systems. An example is the famous Lorenz attractor, which loops back and forth, first inside one cluster of concentric elliptical shapes, then inside a companion cluster.

\textsuperscript{16} The Mandelbrot set, a fascinatingly beautiful diagram of chaos, is a close relative of the Feigenbaum diagram, and it is named after Bernard Mandelbrot who did so much to establish the mathematics of fractals and their computer applications.

\textsuperscript{17} This is accomplished by means of something called Lyaplonov coefficients.

\textsuperscript{18} This is in contrast to most of the mechanical systems with which we are familiar wherein the input and output are proportional. For example, the more you step on a brake pedal in your car, the more the car tends to stop.
All these attractors express the dynamics of a variety of forces, some of which expand and others that serve to contract, brake, or condense trajectories within phase space (Quinodoz, 1997). Most interesting, the trajectory of strange attractors is self-repeating on smaller and smaller scales, so that in the case of strange attractors fractal qualities are always the rule. Quinodoz, under the influence of French/Swiss culture, sees these attractors as constructed much like French pastry or bread, with multiple inner foldings or, you might say, layers of self-sameness.

The very novelty of the terminology of chaos theory, of course, is potentially confusing, at least at first sight, but the ideas expressed may turn out to be useful to psychoanalysis exactly because they capture change in a universal language. Moreover they (like the differential equations which lie behind them) wrestle with the precise nature of change, that is, with its geometry and timing. Mathematicians think of such qualities of attractors, mapped onto a multidimensional phase space, as reflecting the various identifiable factors whose alteration changes or shapes the trajectory of their system.

So we can begin to understand that because chaos theory constitutes a very precise way of denoting change qualitatively and quantitatively while simultaneously noting the role of specific factors producing the change, it becomes more reasonable that Galatzer-Levy and others believe such mathematical descriptions might enhance our understanding of such things as psychological development by adducing the mathematical rules underlying complex outcomes. This orderliness is reflected in Mitchell Feigenbaum’s diagrams, and particularly in Feigenbaum’s formulation of what he calls universality. This term refers to the following idea: the point in the Feigenbaum diagram where chaos starts (that is, the particular value of “a”) logically contains within it all of the information that is manifested by all subsequent chaotic events.

Moreover, as I noted earlier, and this has been a surprise to everyone: the pattern of chaos depicted in the Feigenbaum diagram of Figure 1 appears to be universal in the sense that virtually all chaotic phenomena studied in nature to

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19 Phase space simply refers to the space illustrated by the mathematical diagrams. These are usually two-dimensional drawings which depict events that can be considered to be of three or more dimensions. The word trajectory implies that if you watched the diagram draw itself, say on a computer, you would see the picture start at a single point, and then move across the two dimensions of the screen in a complex pattern, leaving behind it a line which represents a picture that in essence is the attractor. This pathway could be simple, or complex, but it is a clever way of showing development.

20 Japanese sword makers discovered how to make the strongest swords over 1,000 years ago by folding the forged steel upon itself repeatedly, forming what can now be recognized as an inner fractal geometry (similar to that in French bread).

21 This is a mathematical way of saying that the trajectories we label as chaos are predetermined by exact specifiable mathematical equations which we can discover.
this point are structured mathematically identically. This gives us a feeling that we are discovering some decisive orderliness in nature. Complex nonlinear behavior no longer seems random against the backdrop of our growing knowledge of chaos which reveals the hidden order of various phenomena.

Another interesting aside: the transitions zones from order into rapid doubling (and also back) are actually themselves neither orderly nor chaotic per se but something sui generis. Such transitional zones are perhaps the most interesting special states demanding scrutiny in this new science of chaos.

Psychopathology and Complexity

Lest one conclude that all this mathematical gobbledygook is too arcane to be relevant to psychoanalysis, consider that psychoanalysis has long been fixated on how seemingly small differences in initial conditions radically may sometimes alter outcomes! In fact, this is why we analysts pay special attention to the direction and time course of change and shifts in state of our patients. As in the case of Wolf’s depiction of Alexander and his patient, part of every transference analysis involves attention to such details. Moreover Freud’s so-called genetic hypothesis, along with our general attempts as analysts to understand what particular experience means to a given patient, also relies on our analysis of the effects of subtle changes in initial conditions.

In fact, one can argue that psychoanalysis has literally been built on this question of understanding precisely the effect of subtle initial differences in personal meanings or interpretative responses or both, variables that fluctuate and interact in a lawful manner. So we are each of us, without knowing it, from the mathematical perspective, already deeply involved with chaotic phenomena; therefore it makes good sense to make use of chaos theory to shed further light on mental processing.

Let us now turn briefly to the issue of pathology, which involves special patterns of mental functioning. Galatzer-Levy, Levin, and Moran seem to agree that either extreme regularity or extreme disorganization are capable of leading to psychopathology, from the viewpoint of chaos theory. It will help, however, to clarify that the freely fluctuating states of chaos and regularity, which occur in complex nonlinear systems, are probably normative in the sense that they are expected properties of complex systems, that is, they obtain when such systems are working properly. In other words, we must be careful not fall into the trap of connecting chaos itself with abnormality.

Rather, from the vantage point of chaos theory, abnormality would seem to occur when the mind/brain gets locked into either chaotic or highly regular states, rather than shifting naturally in and out of chaos in a dynamically normal yet complex manner. In other words, psychopathology might be considered as the lack of freedom. In contrast with freedom, fixity, or the aberration from the
natural (variable) pattern of entry into and exit from complex systems, could be considered the real psychopathological culprit. To think of such fixity, just reflect on obsessive compulsive illness or any significant character disorder.

Utena (1996), whose *Kabuki model* was touched on in note 10, has commented on the significance of freedom in exactly the sense earlier implied. He writes that we all need to be free in terms of three variables: freedom in the sense of having *optimally functioning brains* (which is where the various biologically oriented interventions come in); freedom in terms of *mastering psychological development*, which allows us to access the functional capabilities of our mind (which is where most psychotherapy and psychoanalysis enters in); and *freedom to enjoy living within a community* of other people (this is the important social domain). For Utena, normal development is that which supports or creates having choices. As analysts we work hard to assist the actuation of each such freedom in our patients. In other words, imagine that mental freedom reflects the proper free functioning of chaotic systems in mind and brain. Or, as Moran (1991) puts it, some psychoanalytic interventions might essentially be working by *adding complexity* to nonlinear systems and thus interfering with fixity.

**The Case of Learning**

Let us now address the variable we call learning. Although there is as yet no generally accepted psychoanalytic theory of learning, there have been continuing efforts to apply interdisciplinary perspectives toward this purpose (Levin, 1991, 1997b; see especially chapters 1–5 of Levin, in press). In what follows I elaborate further on such a learning theory, but this time focused on Priel and Schreiber’s assertion that *shifts into chaos are important facilitators of learning*.

Priel and Schreiber (1994) make two decisive points. First, they highlight Freud’s historical description that logical chains of associations involve two or more threads of associations meeting and proceeding as one. They see this formation of associative chains as neatly overlapping the mathematical perspective of a bifurcation point topographically, but “where one [or more] of the ramifications has been suppressed” (p. 212). It should be noted that these researchers are assuming, without exactly saying so, that the acquisition of knowledge (i.e., learning) accrues from the expansion and increasing depth of associative trees.

Second, Priel and Schreiber (1994) state explicitly that the psychoanalytic transference phenomenon is illuminated when seen in relation to the behavior of the so-called *strange attractors* of chaos theory (p. 214), where transferences are “transitions from [non chaotic] limit cycles [i.e., intermediate attractors] to strange [i.e., more complex chaotic] attractors through [the mechanism of]
bifurcation" (p. 214). In other words, these authors believe that "bifurcation potentially creates information . . . [through the mechanism of] space symmetry breaking" which they see as "the necessary prerequisite without which the possibility of constructing an information processor simply would not exist" (p. 214).

(Incidentally, what Priel and Schreiber refer to as a system within which occur shifts in attractor seems to me to coincide with the previously mentioned increases in the direction of system complexity. Such complexity is an antidote to psychopathology.) But what then is symmetry breaking? I shall take this up next.

Symmetry Breaking

The term symmetry breaking appears in physics, computer and engineering science, cognitive neuroscience, and psychoanalysis. Within cosmology it refers to a creative phase in the origin of the macroscopic universe consequent to the so-called Big Bang, where the original symmetry (homogeneity) is broken and apparent local concentrations of matter settle out as the known subatomic particles, elements, and galaxies of the universe. Within the related field of par-

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22 Bifurcation, as mentioned earlier, is rapid doubling, and it is associated with the onset of chaos. Now some may reason that if transferences, as described by Priel and Schreiber (1994), are connected with such transitional states (and also with complex attractors), that (1) they are highly dynamic and transient, and that this does not accord with clinical experience in which transferences are usually seen as states of relatively fixed perceptions and meanings, and (2) that transferences are thus confusing because they are seemingly associated clinically with pathology, and yet their association with complex attractors would seem to imply that they are associated with normality, which I have argued above is associated with complexity! Let me attempt to clear up any possible confusion. First, regarding the first point, I wish to argue that I am not asserting that transferences themselves have any fixed relationship to normality or pathology. Along with Priel and Schreiber, I would argue that bifurcation points in all likelihood contain/express information that ultimately might get tapped in the expression of transferences. But even if this speculation would be correct, it does not need to imply that the transferences which thereby get expressed are themselves transient. Regarding the second point of possible confusion, let me note that I am not asserting that the shift to chaotic attractors that Priel and Schreiber write about (speculatively associated with transference) is a move that is in itself toward or away from health. Rather I believe in the possibility that individuals may come recurrently in and out of chaotic states (in a formal sense) and that these natural mind/brain system shifts in and out of chaos are what is likely connected with normality. In other words, the speculative shift to a chaotic attractor that Priel and Schreiber write about is not in itself connected with increasing pathology or normality. Pathology occurs, as I understand it, when the mind/brain operation becomes rigid or fixed in its operation, and normality is something analysis helps create by adding complexity and flexibility to mind/brain operations.

23 In the next section, I attempt to sort out what symmetry breaking means. Professor Arthur Springer of the University of California (Davis) has been of great help in helping me understand this subject.
particle physics, it refers to deviations in the patterning of the *flavor* and *mass* in the expected variety of subatomic particles (such as quarks, leptons, muons, etc.) (Thomas, 1995; Chivukula, Cohen, Lane, and Simmons, 1997).

Within computer science, symmetry breaking refers to special creative techniques for finding algorithmic and other mathematical solutions to complex network problems (Awerbucch, Cowen, and Smith, 1994). In cognitive neuroscience, symmetry breaking relates to the effects within neural networks of creatively shifting the loading of input variables and system relationships. For instance, the orientations of visual cortical cell columns in the brain are said to be regulated by "symmetry breaking [which alters] cortical feedback connections" (Dong, 1997). It should be obvious that although none of these definitions of symmetry breaking is exactly the same, they nevertheless all share a common theme: the creation of qualitative change via reorganization.

Finally, and most important for our discussion, within psychoanalysis we have the work of Matte-Blanco (1986, 1989), which deals with his own unique version of symmetry breaking. I believe Priel and Schreiber (1994) have this in mind without exactly saying so!

Matte-Blanco (1986, 1989) has developed a self-consistent theory depicting the mind/brain's so-called *biloc*ic, by which he means that the unconscious mind's (primary process) logic is always in stark contrast with the (secondary process) logic of the conscious mind. In applying his theories Matte-Blanco systematically incorporates the idea of symmetry breaking to explain shifts between belief systems which are seen as symmetrical or asymmetrical, and on the other hand, which appear associated with steps in psychological development stimulated by psychoanalytic interventions of various kinds. An example will help quickly explain how symmetry breaking is used by Matte-Blanco.

Wolf's earlier discussion of Franz Alexander's patient is actually quite similar to one Matte-Blanco (1989) discusses in detail from the perspective of symmetry breaking. Both these patients begin treatment in a stage in which their memories of their father have been kept relatively frozen. Under the influence of creative psychoanalytic intervention, however, a stage (of symmetry) is entered where each patient sees his analyst not merely as similar to but literally identical with his father imago (imbued with positive qualities). Next these patients move into a treatment stage that is symmetrical in a different sense: now they see themselves and their analyst/father as similar25 (while retaining the

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24 The late David N. Schramm, of the University of Chicago, made his major contribution in the area of connecting the cosmology of the so-called Big Bang and particle physics, primarily through his idea that there are only three families of subatomic particles. Schramm based his assessment of the nature of the Big Bang at least partially on considerations of symmetry breaking.
positive valence of both images). Finally, these patients move into a decisive asymmetrical stage (which coincides with symmetry breaking) in which they see themselves as persons separate\textsuperscript{26} from both their father and their analyst, while nevertheless retaining a feeling of positivity about themselves.

Let us return briefly to Priel and Schreiber (1994), who quote Heisenberg (1971) as follows: "The same organizing forces that have created nature in all its forms, are responsible for the structure of the soul, and likewise, for our capacity to think" (p. 217). Their use of symmetry breaking, although not entirely unambiguous, relies on the work of Heisenberg (1971), of Nicolis and Prigonine (1981, 1989), and I believe of Matte-Blanco (1986), as I noted earlier. Each of these investigators believe that how we think, feel, and behave derives from the variegated patterns of feedforward and feedback processes which alter the chaotic system we call our self, breaking new ground in creative acts. Such acts these investigators designate symmetry breaking, a term bathed in a rich network of associations of differentiation in various natural settings.

Let me attempt to synthesize the various perspectives covered in this and the previous section. It seems logical to conclude that there is likely such a thing in humans as optimal chaos. This optimal chaos would seem to involve the "freedom" to form novel bifurcation points in one's thinking, thus decisively organizing and reorganizing mind/brain data bases (i.e., creating new connections, ideas, affects, and memories). Such freedom could also be conceptualized as a consequence of significant increments in the complexity in the nonlinear dynamical systems we call mind/brain. In other words, the freedom to break symmetry and operate with mind/brain systems on the edge of chaos (rather than getting trapped in some rigid or fixed mind/brain systems) optimizes learning. This is a novel explanation for psychological change compared with the usual explanations (Shevrin, 1998).\textsuperscript{27}

\textsuperscript{26}A number of additional viewpoints could be applied to symmetry-breaking phases, as described by Matte-Blanco (1986): one would be Kohut's so-called twinship (selfobject) transference; another the perspectives of various varieties of selfobject differentiation and/or individuation as in the theorizing of Margaret Mahler, Otto Kernberg, and Melanie Klein.

\textsuperscript{27}In Kohut's self psychology this separateness would indicate a shift out of a self/object transference and into a self/ihibidinal-object transference.

\textsuperscript{27}Shevrin's essay, while superficially describing why we need consciousness, is really an essay that brilliantly describes how conscious mechanisms are the critical requirement for some learning which changes the vast nonconscious and unconscious parts of the mind/brain. Without such learning human progress would be impossible. It needs to be noted, however, that learning in no way requires consciousness; that a great deal of learning in life and in psychoanalysis is without conscious awareness. This essay on chaos theory is partly an attempt to get more precise about how various kinds of learning might occur. In another essay, written with Colwyn Trevarthen (this Annual), I make a further attempt to tie together loose ends of a psychoanalytic theory of learning.
Sashin and Callahan’s Discovery: The Tunnel

Let me conclude this essay by touching on two novel perspectives. The first and most important comes from the work of Sashin and Callahan (1990), who developed a double cusp model of the mind. Putting their mathematical model through its paces, they discovered an unexpected topological shape, which they called the tunnel, the observation of a phenomenon that I find compelling.

Sashin and Callahan (1990) are properly content not to speculate overly about the significance of the topology they call the tunnel, a purely empirical mathematical observation. However, picking up on their own intuition, I wish to speculate that their “tunnel” might have a clinical correlation as follows: it could coincide with moments/circumstances (as occur in every successful analysis) where the patient is finally able to feel the full intensity of private important affects, but where such emotion is now only modestly inclining the patient toward disruption (i.e., where the experiencing patient essentially feels safely able to contain feelings which were previously enormously disturbing). Sashin and Callahan’s conclusion follows from the way their exact variable loadings in the model are controlled.

Now the idea of a container function is not new to psychoanalysis. It has been noted by Bion (1967) and others. But the tunnel, conceived by Sashin and Callahan (1990) in space-time, is also the virtual space where these two researchers conceptualize that mending occurs in the emotional container function. Most important here, the observation of a tunnel coinciding with an emotional container function is strictly an empirical finding which grew out of Sashin and Callahan’s strictly mathematical analysis of affect responses to stressors in a chaos model within a 10-dimensional space. Clinical research is of course needed to confirm their findings.

In terms of the earlier notation of symmetry breaking, the tunnel would appear to represent a decisive configuration in space-time which allows for creative kinds of information processing associated with “freedom” in the exact sense described by Utena (1996), whose work I discussed earlier.

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28 It is, of course, impossible to distinguish between whether this tunnel would represent the actual possibility of affect containment, or whether it is merely emblematic of the achievement of those circumstances that would make such a process possible.

29 A 10-dimensional space merely means that the model involves 10 variables each, considered to represent an important spatial dimension. Current “string theory” and its derivative theories in physics employ the same idea of n-dimensionality, often imagining a world composed of the four usual dimensions (three spatial and one for time) plus added dimensions of a seemingly fanciful sort (i.e., as a mental construct), which are of course not “visible” to humans, but which are imaginable and have a theoretical validity nevertheless.
Chaos and Higher Mental Functions

Second, I wish to speculate further, based on an empirical correlation of my own. While writing this essay, I wondered if any independent general supportive evidence could be found that the higher cognitive functions in man reflect chaotic patterns. If certain chaotic states express higher mental functioning, might electroencephalogram (EEG) patterns associated with our higher mental functions show a precise relationship to Feigenbaum’s constants?

Duilio Giannitripani devoted himself to studying the EEG correlates of higher cognitive functions. Most interestingly, his treatise of this subject shows that all the EEG frequencies associated with higher mental functions are themselves multiples of 3.5, something he calls Giannitripani’s rule of 3.5. Now you may recall that Feigenbaum’s point (where chaos begins) is invariably 3.5699456 . . . , which is of course approximately 3.5! Naturally, such a correlation might be irrelevant or accidental; to discover if it means anything deeper requires further research.30

Summary

Chaos theory contributes a supremely useful terminology for and a way of thinking about development, learning, and psychopathology. In a nutshell, psychoanalysis invites learning by means of its effect on the hierarchical modes of the mind so that new levels of complexity are added to the ways these modes are actually utilized (i.e., instantiated in mind/brain). The consequence is that psychopathology based on rigid or fixed mental functioning is reduced to a minimum, and instead new freedom of a biopsychosocial sort is created. In strict mathematical terms, freedom is a signal property of nonlinear deterministic systems when they operate on the edge of chaos and the edge of fixity or regularity.

Through the terminology of chaos theory, we can better describe what we are observing clinically in terms of something more fundamental in nature. From such a perspective, psychological development is merely one important example of the chaotic normalcy of the world. And psychopathology, in contrast, is the loss of freedom associated with fixity, when complex systems become too simple

30 A recent note from Howard Shevrin observes the following: “I presented a panel on subliminal evoked response potentials (ERPs) at the Society for Psychophysiological Research meetings. Now subliminal ERPs look like noise to the naked eye, and ERP researchers like to see what ERPs look like. In order to show that subliminal ERPs have the same structure as supraliminal ERPs, something that our statistical findings amply bore out, we multiplied the subliminal ERP plots by a factor, thus ‘blowing up’ the subliminal ERPs and bringing them into the same amplitude range as the supraliminal ERPs. The factor was four.” In other words, the correlation of Giannitripani’s rule to Feigenbaum’s point may or may not be significant. Howard Shevrin’s remark to me, on my mentioning my so-called correlation, indicates the primitive state we are in regarding the application of chaos theory to psychoanalysis and sister sciences studying mind/brain.
or disorganized and therefore are no longer resistant to minor irritants (as pos-
tioned by Galatzer-Levy, 1978, Moran, 1991, and a number of other researchers
applying chaos theory to psychoanalysis), or when learning has relatively stopped
(Levin, 1991).

Scholars of mathematics, neuroscience, psychology, and psychoanalysis have
been experimenting with chaos theory to establish better models of develop-
mental change, learning, and psychopathology. In particular, they awaken us to
various kinds of symmetry breaking that appears to be a correlate of change. We
need to credit the pioneer polymath psychoanalysts, such as Sashin, Galatzer-
Levy, Moran, Forrest, Matte-Blanco, and others, for their highly original work
in this bridging area. Most of all we need to follow up on insights such as Sashin’s
and Callahan’s regarding the tunnel and the container function, which would
seem to epitomize in strict mathematical language what psychoanalysis has al-
ready adumbrated in a number of its theories: growth of our faculty to contain
our most intense and precious emotions is a decisive element in learning and
development, and its absence undoubtedly contributes to psychopathology.

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All the life in the body is the life of the individual cells. There are thus millions upon millions of centres of life in each animal body. So what needs to be explained is . . . unifying control, by reason of which we not only have unified behaviour, which can be observed by others, but also consciousness of a unified experience.

—Alfred North Whitehead

Gedo’s developmental hierarchical model, which he and Goldberg originated (Gedo and Goldberg, 1973) and he has continued to refine (Gedo, 1993), offers clinicians and researchers alike remarkable assistance in organizing their thinking about the patterns and mechanisms of mind/brain. Most interesting to this monograph, Gedo has employed his model to explore consciousness, a subject on the boundary between the psychological and the biological (1988, 1991a, 1991b).

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Gedo’s (1996) writing on consciousness has already been introduced; now we begin to sort out conscious and unconscious relations, as illustrated by 3 of his 62 patients who demonstrated altered states of consciousness sometime during their analysis. The clouding of consciousness in such adult patients is understood by Gedo and others (e.g., Brenner, 1996) as reflecting a lack of autonomy, secondary to the circumstance of early, severe, and continuing trauma. In fact, all three patients suffered similar kinds of emotional trauma starting during their first 12 months of life and extending for years beyond; they meet the criteria for post-traumatic stress disorder (PTSD).

The general importance of consciousness to psychoanalysis can be illustrated most easily by Shevrin’s (1992) observation that within analytic treatment mere understanding is rarely enough to change anyone’s behavior. Rather, what repeatedly proves decisive in clinical psychoanalysis is a raising of the level of the patient’s consciousness, particularly consciousness of feelings within the transference, so that awareness of various hidden wishes, fears, conflicts and complex mental states can occur in a manner that leads to a sense of conviction, understanding, working through, and lasting change (Shevrin, 1992; Gedo, 1995; Levin, 1997b).

Definitions of Consciousness

Sperry (1983) defines consciousness as “the highest level organizing principle of the mind.” Trevarthen (1979) contrasts three strands of consciousness in the following way: First, “conscious intentionality is knowing what one is . . . [intending], and why”; second, “conscious awareness is being perceptive of . . . what is being seen, heard, touched, etc.”; and third, “conscious sharing of knowledge and personal feelings is having intimacy with the consciousness of others and awareness of affectional and moral responsibility to them” (p. 189).

Conscious aspects of the ECN contribute to the felt experience of self cohesion, intentionality, and autonomy. Consciousness can also be conceptualized as that self experience which corresponds with the activities of the ECN (Posner, 1994, p. 7400). This anatomically localizes the suite of conscious-related functions.

A number of factors complicate the study of consciousness. Understanding what consciousness might be contributing to the ECN requires patience. Adding to our confusion, a multiplicity of synonyms has been used within cognitive neuroscience: along with the phrases executive control network, attentional system, and executive attentional network (Posner, 1994, p. 7400), there are references to the supervisory system (Shallice, 1988), neural control (Ito, 1984, 1985, 1988, 1993; Niwa, 1989; Levin, 1991), and self-regulation (Gedo, 1979; Wilson, Passik, and Faude, 1990; Emde, 1988; Lichtenberg, 1989). But are the references the same?
Consciousness and the Community of Others

It will help to place consciousness in social context. Imaginative consciousness takes place in a community of understanding (Vygotsky, 1956; Wittgenstein, 1953; Trevarthen, 1990). Although we are individuals and analysis investigates our uniqueness, we are happily or unhappily part of a nexus of intersubjective relationships that shape, value, and add meaning to our lives.

Intersubjective relationships play an important role in the early development of our self-confidence, knowledge, and skills—throughout our development. Somehow this consciousness with others depends on the way we pursue purposes in awareness, and with feelings. Our conscious perceptions are not passively received, but rather the results of active searches for particular experience. Sharing conscious experience is also a primary human motivation.

Planned actions are themselves motivated and guided by specific conscious motor images, in which neuroscience has long been interested, but that are still at the margins of psychological theory (Sperry, 1950, 1952; Ingvar, 1994; Jeannerod, 1994). In spite of limited knowledge, as Posner puts it now, there is "surprising evidence for . . . [an ECN] involved in a wide range of tasks . . . as different as detecting visual targets, controlling verbal working memory, noting errors, generating associations and resisting conflict . . . All [show] activity within a strip of tissue along the central midline, mostly within the anterior cingulate gyrus" (Posner, 1996, p. 82). Posner is attempting to identify a nexus in mind/brain networks where intentions enhance experience by way of selective attention.

An interesting, and possibly novel, characteristic of the human variety of conscious experience is that we are ordinarily capable of tracking multiple trains of thought simultaneously, generating polyrhythms of purpose and experience, with branching or overlapping chains of foci for consciousness. Freud's early theorizing (1910) revolves around the coexistence of antithetical thoughts, a necessary basis for any conflict psychology. Less well known, however, is evidence that such parallel processing starts early in life (Trevarthen, 1997). Multiple tracks of awareness and thinking are products of a mind that has gained freedom through gestures, narrative mimesis, and language.

Especially helpful are Posner and Rothbarts's efforts summarizing their data on the onset of the appearance of attentional control. Very young infants have simpler and less reliable strategies for orienting their awareness, whereas a year or so later in life aspects of attention such as conflict and error detection in children, which are more clearly related to confident executive control, can be measured (Posner, 1997, personal communication).

More fascinating still is evidence that the patterning of our mental life with each other is largely genetically constrained, although environmentally released. Inner genetic blueprints and epigenetic schedules for a purposeful and conscious life sympathetic to the motives of others such as ourselves start unfolding before birth in embryo and fetus, and continue to express themselves throughout the
life cycle. This programming includes the expectable stages in Gedo and Goldberg’s (1973) hierarchical developmental model. For example, a trait as basic as our inclination to imitate each other, and the complementary pleasure in being imitated, are inborn capacities we can manifest within hours of birth.

Baby and Mother—Two Consciousnesses Resonating as One

Communication between mother and baby starts, for the mother, at the very least any time after the awareness that conception has occurred. It culminates in Winnicott’s primary maternal preoccupation. We do not know exactly when baby actively joins in the real dialogue, but evidence supports the view that some form of embryonic consciousness and sympathetic response to the mother’s messages actually starts before birth through the baby’s listening to sounds of the mother’s voice and its awareness of her movements and such other sensations as her touch. There are also the baby’s responses in the form of movements which the mother can detect, thus locking the two into an early motor dialogue.

Shortly after birth the newborn can be ready to engage in “proto-conversations” with its mother and to imitate mother’s facial expressions and hand movements, something that could not possibly have been learned (Trevarthen, 1989, 1995). A newborn baby, whose heartbeat accelerates with excitement when imitating, can voluntarily give back the imitated gesture to “provoke” a reply from a watching and waiting partner; the baby’s heart slows as a response is expected (Nagy and Molnar, 1994).

Both mother and infant actively choose to engage in such intersubjective experiences, whereas over time the baby’s semiotic repertoire extends from first messages communicated via affects in gestures and concrete signals directed toward objects and events, to verbal interchange, which gradually acquires a grammatically coded syntax, and ultimately to the creation and communication of shared representational and motivated narratives (Levin, 1991; Gedo, 1996, p. 95). The felt sense of a conscious, autonomous self thus clearly builds through modes or stages in intimate companionship with the states of other minds.

Various kinds of mapping of diverse fields of reality also occur in the baby over time. The baby explores his or her body parts and their relationship to each other, locates purposes in a personal space, and can fill this with real, concrete experiences of intentional looking, reaching to touch, or listening; all such sensory experiences map the baby’s self-conscious place in a community of human relationships, identifying individuals as family or strangers.

Cultures define normative expectations for role relationships, ambitions, and values, which are themselves gradually internalized and recognized by the newborn, but the generation of this learning is within the social curiosity of the infant (i.e., an innate intersubjectivity). The baby’s intuition for human life is matched by the mother’s willing offer of expressive play and concern for both
the physical and mental aspects of life. When the time is right to communicate with and interpret her willing infant, a happy mother does not even need to learn motherese from her culture—she is born with an intuitive fluency of vocal expression for conversation, offered with appropriate feeling and richly embellished by gestures and postures, and she uses it (Trevarthen, 1989, 1997).

The voices and movements of mother and baby are continuously alive with feelings, and even with their later use of grammatical language, the very sounds and movements of mouth, tongue, and lips often continue to imitate the meanings intended, as noted by Fónagy (1971, 1987). For example, the speaker who is angry, in almost every language, throttles his threats and curses! And affectionate words like “kiss” veritably ooze with sentiment. This human skill for representation of meaning in bodily gesture and “tone” of movement has been called “mimesis” by Donald (1991), who considers it the indispensable phylogenetic precursor of language (see also Levin, 1991).

Sympathetic consciousness of emotions identifies what is salient for learning (Levin, 1991, 1997a, 1997b) for establishing goals and values, as well as for consolidating interpersonal bonds (Trevarthen, 1979, 1993). Writing from an evolutionary perspective, Langer (1967, p. 444) notes that “value exists only where there is [a shared sense of] consciousness. Where nothing is [consciously] felt, nothing matters.” Consciousness is equated with feeling, which can only mean that it derives from purposes. Shared emotions and values enable us to better understand each other as individuals and as members of a particular family, societal group, and culture. Engagement with others neatly doubles, as well, as a prototype for internal organization of thoughts in the conversational mode (Vygotsky, 1956; Wittgenstein, 1953), as well as for the evolution of a defined, cohesive, and autonomous sense of self (Winnicott, 1969; Kohut, 1971; Gedo, 1993).

But what really does this rich, varied, and fundamentally innate consciousness in companionship consist of in terms of mind/brain? In what follows we elaborate on bottom-up, then top-down theorizing. Where appropriate we offer speculations toward further understanding Gedo’s three traumatized patients.

Neuropsychological Studies of Consciousness: The Bottom-Up

“The bottom-up approach . . . look[s] at the physiological components and infer[s] from a knowledge of them how the whole system must work” (Crook, 1988, p. 350). To understand consciousness in bottom-up terms, hypothesizing motivational mechanisms, Posner and his collaborators focus on selective attention within the visual system, which we briefly review here. They identify anterior and posterior attentional systems that show significantly different characteristics (Posner, 1988, 1994, 1995; Bechtereva, Medvedev, and Abdulaev, 1992; Posner et al., 1992; Posner and Raichle, 1994).
The anterior attention system (composed of anterior cingulate gyrus and basal ganglia) serves executive functions and is involved in attentional recruitment and control of brain areas to perform complex cognitive tasks; the posterior attention system (composed of superior parietal cortex, pulvinar and superior colliculus) is largely responsible for selecting one stimulus location among many and for shifting from one stimulus to the next [Stablum, Mogentale and Umilta, 1996, p. 263].

Dehaene, Posner, and Tucker (1994) have also confirmed the importance of the anterior cingulate cortex in monitoring performance and compensating for errors, what they call attention for action (p. 304). The picture that emerges is that of different modules involved in decisions, target selection, zooming in, and detaching from objects of interest (Posner and Raichle, 1994). Damage to the ECN provides information about mind/brain correlations. For example, damage to the anterior cingulate disturbs the entire array of ECN functions, including such activities (of psychoanalytic interest) as error correction, associating, and dealing with conflicts (Posner, 1996).

In PTSD the anterior cingulate (along with amygdalar circuits) has been shown to “play a role in the pathological response of combat veterans . . . to mental images of combat-related scenes” but not in the responses of control subjects to the same stimuli (Shin et al., 1997). In autism and the related condition Apsberger’s syndrome, decreased metabolic activity has been found in the cingulate gyrus on PET scan (Minshew, 1992, cited in Aronowitz et al., 1997). As Posner indicates, establishing ties between the PET work on infants and various kinds of developmental pathology would be extremely important for understanding mind/brain mechanisms (Posner, 1997, personal communication).

In contrast to the case of damage to the anterior attentional system, damage to the parietal lobe (part of the posterior attention system) typically interferes with the ability to detach gaze from objects of interest (Posner, 1996). Thus, although we cannot be certain, it seems unlikely that the posterior attentional system plays any role in the problems of Gedo’s traumatized patients. More likely, the clouding of their consciousness relates to traumatically induced changes in either the anterior portion of the ECN, its “extensions” (which we will describe), or the system relationships between the ECN and its “extensions.”

Posner et al.’s research has stimulated detailed investigation of various aspects of control of the visual and other sensory systems (Posner et al., 1992; Mattingly, Davis, and Driver, 1997; Rees, Frackowiak, and Firth, 1997). Visual control bears a clear relationship to our subjective experience of awareness because the anterior cingulate activates when subjects detect visual targets and is quiescent when thoughts are cleared (Posner and Raichle, 1994, pp. 178–179).

The research of Posner and his colleagues has also spawned clinical tests for identifying and even quantifying subtle but significant evidence of closed head
injury to the ECN, based on performance on visual tracking paradigms (Stablum et al., 1996). Such examination of Gedo’s three analysands could effectively identify covert neurological injury and further localize which portion of the attentional system is involved.

The ECN’s Extensions

Taking stock briefly, we are suggesting that the ECN includes a core and a variety of ECN extensions. The core structures are the anterior cingulate, basal ganglia, posterior parietal cortex, pulvinar, and superior colliculus. The extensions are the reticular activating system (RAS), orbital frontal and selective other cortex, the amygdalar and hippocampal systems, corpus callosum, and cerebellum.

We begin with the RAS and the orbital frontal cortex. The RAS plays a well known role in general arousal (see Levin, 1991). The orbital frontal cortex acts to inhibit, and sometimes produce amnesia for, impulsive and dangerous behavior. For example, tumors in this area can produce homicidal acts carried out without apparent conscious control (Relkin et al., 1996; Damasio et al., 1994). Hadley (1997) extensively discusses the orbital frontal cortex from the perspective of Schore’s (1994) study of self and brain. Schore speculates that during development in an optimal human environment, dopadrenergic midbrain neurons migrate upwards and forwards into the orbitalfrontal cortex, contributing decisively to self regulation (Schore, 1994; Pally, 1997). We may ask if this migration is part of what early PTSD alters. Later we note other effects of PTSD on the brain.

The next extension is the lateral prefrontal cortex, which “appear[s] to hold the relevant information [for conscious tasks] on-line” for the cingulate cortex (Posner, 1994, p. 7401), “a process known as working memory,” a function currently without absolutely agreed upon boundaries (Rao, Rainer, and Miller, 1997, p. 821; Baddeley, 1986).

The cerebellum, which we are considering an ECN extension, influences a variety of sensory, motor, attentional, and cognitive systems “in order to accomplish its prime function which is to learn to predict and prepare for imminent information acquisition, analysis, and action” (Allen et al., 1997, p. 1942; Levin, 1991; Levin and Vuckovich, 1983). In this way, “through its connections with attentional systems [the cerebellum] influences the speed and accuracy of . . . attentional changes” (Allen et al., 1997, p. 1943; also see Trevarthen, 1990, p. 54).

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1 Those familiar with the ECN extensions may wish to jump to the following section.
Consider also as ECN extension the amygdalar and hippocampal systems. As noted earlier in this essay, the hippocampus is responsible for creating and modifying the data bases of mind/brain (Palombo, 1998).

In a separate study of selective focal hippocampal damage early in life (Vargha-Khadem et al., 1997), there is evidence that although episodic and semantic memory seem at least partially dissociable, “only the episodic component [seems] fully dependent upon the hippocampus” (p. 376), which fits with the work of the Damasio group already noted. Incidentally, such hippocampal damage is known to occur in PTSD secondary to the effect of stress-related chronically high blood levels of corticosteroids, and has been correlated with the patient’s difficulty, once this condition begins, in properly analyzing stress and choosing adaptive responses to it. Instead the subject reacts in a uniformly reflexive manner (van der Kolk, 1997).

Returning to Gedo’s three traumatized patients, it seems that although psychoanalysis could be used to attempt to understand what these subjects originally experienced, and thus eventually acquire knowledge of the circumstances of their trauma, this might be difficult precisely because any association or recollection within such treatment would itself depend to some degree on the function of damaged hippocampuses (the organizers of mind/brain data bases)! This is, in fact, why skilled analysts do not rely entirely on the patient’s associations or memories to come to various conclusions, but also examine carefully their (transferential) affective and behavioral patterns in the treatment situation.

Commissurotomy

The final ECN extension is the corpus callosum, which interconnects the hemispheres and is itself associative cortex. This subject is sufficiently convoluted

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2 As an aside, the amygdalar and hippocampal systems show an interesting double dissociation effecting consciousness that has been identified by Damasio’s group at Iowa (Bechara et al., 1995). Specifically, bilateral damage to the amygdala prevents learning aversive responses, yet allows one to nevertheless learn the special circumstances associated with the appearance of pain (i.e., it damages semantic memory). In contrast, bilateral hippocampal damage allows aversive response learning to proceed normally but interferes with learning the associated specific circumstances (i.e., it damages episodic memory). This dissociation is what leads Hadley (1997) to call the hippocampal module a system for belief (we prefer concern) and the amygdalar module a system for knowledge. You might wish to think of the amygdala, also, as the fast circuit for reporting emergencies to higher centers, for rapid response.

3 Levin and Vuckovich (1983) have speculated that psychoanalysis is perfectly designed to accomplish such a task, as, for example, when we overcome so-called horizontal and vertical splits in the ego (conditions that they conceptualize as disavowal, i.e., right-to-left and repression, i.e., left-to-right interhemispheric communication blocks).
that it is best considered in a separate section. The psychological effects of callosal transection have been studied extensively (Sperry and Zaidel, 1977; Trevarthen, 1975, 1979, 1990). Commissurotomy, in “test” circumstances where deployment of purposes and attentions is constrained, “detaches the two cortical memory stores so they operate as independent associative systems” (Trevarthen, 1990, p. 74).

Commissurotomy, usually done to stop otherwise uncontrollable epilepsy, can cause abnormally unstable attention and lead to fluctuating neglect, loss of vigilance, unconstrained perceptual completion of image building, mutism, and transient apraxias. However, perhaps unexpectedly, commissurotomy patients are not as troubled as normals are when presented with conflicting perceptual tasks. In fact, under such circumstances they actually show enhanced perceptual processing in the sense of readily holding within perception completely incompatible data sets!

Let us linger here to observe that the neurological concept of separate (incompatible) consciousnesses in split-brain patients overlaps the Freudian concept of incompatible ideas coexisting within the normal mind. Our reading, from an interdisciplinary perspective, is that in this isomorphism we catch a glimpse of some critical design features of the normal human brain.

If under ordinary circumstances two or more separate and distinct consciousnesses can occur in one mind, as Freud noted, and as split-brain subjects readily demonstrate, then this can only mean that the mind often behaves as if a true integration of incompatibilities exists when this in fact is not the case (Bogen, 1990; Trevarthen, 1990; see also Rao, Rainer, and Miller, 1997, for an interesting example of research on the integration of sensory data in the prefrontal cortex). But how and for what reason is the appearance of integration accomplished, from either an experience near or distant perspective?

One way would be for frequent control decisions made by the mind/brain in order to switch mental processing between low-level, routine, automatic-attentional mechanisms (which might potentially get us into trouble by inviting awareness of incompatible impulses, thoughts, and feelings) and high-level, selective, attentional mechanisms (which would have the capacity to mix and match the complex machinery of mind/brain in ways that safeguard mental life). We are of course describing here the well-known psychological defense mechanisms used by the mind/brain to deal with conflict or its mere appearance. We also are describing what would appear to be a known operation of the ECN.

We are arguing, on a logical basis, that the very same control structures of the mind/brain that create consciousness also create the dynamic unconscious. Thus, the anterior cingulate cortex, by making high-level decisions to selectively expand or shrink the ECN (by including or excluding extensions from the neural network), is using its capacity for selectivity of attention (i.e., consciousness) to
protect unconscious thoughts, goals, and aims. For example, by eliminating or at least dampening cerebellar input to the ECN temporarily, the anterior cingulate could render "invisible" evidences of discrepancies between real and expected input, the kind of discrepancies that would otherwise invite awareness of unconscious motives. Later, when the ECN estimates that such discrepancies can be dealt with effectively, the cerebellar "gating" would be halted.

If we now switch back from a psychoanalytic to a cognitive neuroscience perspective, there is good evidence accumulating that the coordination of the different viewpoints of the two cerebral hemispheres ordinarily falls to the ECN and its "extensions" as a group. This has been examined exhaustively by Shallice (1998), and is covered in the next section. The bottom line, however, is that "consciousness in the hemispheres may be profoundly changed by lateralized activation of the cortex. Such 'metacontrol' can further lead to poor cognitive performance . . . [for example] if allocation of activity is to a hemisphere ill-equipped for a given task" (Trevathan, 1990, p. 75).

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4 Our idea coincides with a new essay of Opatow (1998) cited by Shevrin (1998). Opatow begins with imagining the situation of the infant that Freud discusses, hallucinatory wish fulfillment. Assume the infant has fed at mother's breast, and is now imagining doing so again, that is, hallucinating (imagining) the breast. He or she is feeling hungry, yet associating to the source of food, softness, and comfort in the arms of mother. However, the pleasure in the imagery of being at mother's breast does not satisfy, that is, it is not the same as really being there, and it also does not last. After a period of time, frustration ensues, and the familiar distress signals begin which signal the mother to the infant's need to have an actual feeding. However, if these cycles are repeated sufficiently, Opatow argues, at some point a momentous decision is made by the infant developmentally who "negates the entire mental mode of hallucinating (imagining) wish fulfillment, not simply individual instances of doing so," and, as Opatow puts it (cited by Shevrin) "at this juncture both consciousness and the unconscious are born" (Shevrin, 1998, p. 11). The unconscious thus begins as a mental set associated with the negation of the mode of hallucinatated wish fulfillment, yet still guided by what Freud called the pleasure principle. In contrast, consciousness continues under what Freud called the reality principle. Opotow states clearly, however, and this seems correct clinically, that these two mental domains are not clearly demarcated, and thus remain mixed to partial degrees forever, with unconscious elements continually influencing behavior via transference, especially when wishes are at variance with reality "and the ability to obtain current appropriate satisfaction is impaired" (Shevrin, 1998, p. 11), and where conscious events or subliminally perceived events influence the unconscious.

In our opinion (following Posner, and especially Shallice), the developing young mind operates with a hovering attention, and so long as ordinary wishes become satisfied without difficult delays, it operates using fairly low level reflex type attentional mechanisms. However, as a consequence of significant (excessive) frustration, there begins to occur a decisive shift: The infant becomes capable of shifting the attentional system from low-level contingency planning to high-level executive control, something it accomplishes by briefly expanding the executive control network. At this moment, what comes into existence is the distinction between consciousness, and the unconscious, because the infant's problems of matching inner needs with outer realities requires consciousness for its capacity to take reality into account, and the unconscious to properly reflect and protect wishes and needs. Clearly, conflicts of all sorts are a continuing possibility, and require an adaptive repertoire fulfilled by all subsequent personality development.
Incidentally, the term *metacontrol* was coined by Jerre Levy and Colwyn Trevarthen (1976), and derives from experimental data that suggest activity of a supervisory system or ECN whose decisions essentially match hemisphere with current cognitive task. Clearly, in the present discussion we are extending the meaning of metacontrol significantly to include a defensive/adaptive function (namely, protecting the self or other from seeing and/or experiencing evidence of internal conflict).

As noted, Posner et. al.’s research assigns metacontrol to the anterior cingulate gyrus, which issues orders to executive control modules within the prefrontal cortex, basal ganglia, corpus callosum and/or cerebellum to take over, in various combinations and permutations, thus optimizing information processing for a given situation (Levin, 1991; Rees et. al., 1997; Trevarthen, 1990). Such higher-level *special handling*, as it were, requires consciousness control (or, at least, monitoring) of vast amounts of information. The need for special handling makes consciousness a critical design feature of mind/brain.

Let us reconsider Gedo’s patients in light of these considerations. It is possible that during and after traumatic overload states (i.e., as a consequence), metacontrol is what actually becomes disrupted, so that these patients end up matching various cognitive tasks to the wrong cognitive module, that is, one not well suited for the task at hand. This might show up as momentary confusional states of altered consciousness as the self discovers unanticipated difficulty in task completion. Anxiety and quick responses without forethought would be an expected feature of such difficulty.

To summarize, we are proposing that collosal transection eliminates the highest hierarchical level of commissural linkage, the one “providing flexible choice of behavioral sets and orientations” (Trevarthen, 1990, p. 77). Normally at times of complex problem solving, high risks befall the mind/brain when the ECN is dependent on routine, low-level, inflexible, contingency planning rather than high-level, flexible, organizing principles. The anterior cingulate itself apparently tracks ongoing system events, creates and deploys focal attention to actively search for needed data, and most importantly, recruits and coordinates more of the mind/brain’s controlling machinery when demanded by novelty, difficulty, or the importance of the task at hand.\(^5\)

\(^5\) Recent research by Usher et al. (1999) indicates that the locus coeruleus (LC) may also play a role in attentional shifts “in exploratory behavior and responsiveness to novelty” (Footnote 27, p. 554). By this means the LC “may mediate shifts between [these modes]” (ibid.). It is difficult to know, however, if such shifts (in novelty) are really comparable to the kind of shifts discussed earlier (in relation to difficulty and novelty). It appears, nevertheless, that considerable redundancy is built in to the mind/brain, so the multiple structures noted may be performing essentially the same function or at least complementing each other in the operation of the ECN.
Top-Down Approaches to Consciousness:
The Functions of Consciousness

Top-down "means looking at the design features of elaborate performance and then inferring the sorts of components that could process the performance" (Crook, 1988, p. 350). Shallice (1988) has inferred much about how the mind/brain works from his review of such partially functional states as so-called blind sight, knowledge without awareness, and dual consciousness in the split brain. His conclusions are much the same as our own. According to Shallice, consciousness is essentially an emergent property of four interactive neural control systems—what he calls the overall supervisory system (which employs consciousness to monitor external and internal states and determines special handling for high priority mental operations), the language system (which responds to word-linked triggers with shifts in mental set), contention scheduling (which controls patterns for the more usual and customary low level operations), and episodic memory (which contributes its vast store of personal associations to cognitive processing). As noted earlier, some of the same research has been described under the rubric of "working memory."

Employing the perspective of Shallice, Gedo's three analysands with disturbed consciousness suffer from knowledge without awareness. The problem analytically is how to begin to help them identify that there exists significant episodic, that is, procedural memory (of trauma), which they are not conscious of possessing. Although most often this insight is accomplished in analysis by interpreting transferences, in the case of these patients, it may be more crucial sometimes for the psychoanalyst to recognize that a significant portion of the patient's important affective intensity seems not transferential at all! In somewhat different words, in Gedo’s patients we meet an instance where it would be easy to conflate the cognitive nonconscious with the Freudian unconscious.

Shevrin (1992) reasons that for the rapid retrieval of brain data bases to work, the different varieties of experience must have been properly distinguished from each other in memory. With this aim in mind Shevrin believes that consciousness functions principally to tag (categorize) experience according to whether it is the recollection of a perception, a sensation, a dream, a thought, a wish, and so on. His own empirical research (Shevrin et al., 1996), distinguishing analytic and electroencephalographic markers of unconscious versus conscious events, has lead him to this viewpoint. In other words, if one believes in a dynamic unconscious, it follows that some experiences are known and categorized by one system (say the system conscious) but not by the other (say the unconscious system). It is a short step from this thought to recognizing that even within a single system retrieval might well require a categorization tag to distinguish the various types of experiential memories from each other.

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6 See Tranel and Damasio, 1985.
Shevrin’s perspective appears in the neuropsychological literature under the rubric of procedural/implicit versus semantic/explicit memory. Posner and Rothbart (1994, pp. 48–49) tie the neurology and psychology of consciousness together when they describe, in the case of the anterior attentional system, how explicit learning is blocked by distraction whereas, in the posterior attentional system, implicit learning cannot be so easily blocked. Why is this important?

The importance of such work on learning dissociation is as follows: within the first four months of life, and certainly by one year, infants learn who and what to attend to, and this relatively nondistractible, procedural kind of learning helps them with all further learning by focusing them on information their culture values (Posner and Raichle, 1994). The work on dissociation also helps us appreciate the complexity of the problem of our understanding circumstances where our patients know things they are not aware of knowing; that is, our subtle Lord has created, in mind/brains, multiple memory systems with an adaptive redundancy that staggers the imagination, and sometimes runs amok.

For example, using Shevrin’s insights one must conclude that Gedo’s patients have, through their early trauma, failed to properly tag or categorize critical memories, thus interfering with memory retrieval. When experiences without tags necessarily manifest themselves (primed by experiences in the here and now), their confusing origin and unexpected nature cannot fail to tip such individuals into a temporary clouding, or a fragmentation of consciousness. These disturbed states express the patient’s painful objectless confusion; they also serve as markers of the trauma and history of the deployment of primitive protection against pain by means of the mechanism of nonregistration.

Olds (1992), in company with many cognitive scientists, sees the brain primarily as an information-processing machine. Reasoning from Shannon’s information theory that any information system tends to degrade, Olds believes the key function of consciousness must be to prevent information degradation. Olds is supported by the generator-in-randomness thinking of Rosenblatt and Thickstun (1994), Edelman (1989), Margolis (1987), and the late Michael Basch (1976). Applied to the example of Gedo’s patients, Olds’s reasoning seems as follows: One can imagine that as the patient’s awareness of the true significance of their episodes of disturbed consciousness grows in treatment, the patient will attempt to hold on to this new, now correctly labeled and valued information by repeatedly

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7 However, this dissociability seems not to be the same dissociability that we noted earlier regarding the amygdalar and hippocampal systems. Rather here, explicit learning is being localized anatomically within the ECN whereas procedural (i.e., implicit) learning is given no such localization.

8 The title of our essay makes an allusion to Einstein who is known to have noted how subtle is the Lord, whenever he confronted problems that were, in his opinion, of the highest level of difficulty. It is our belief that the current subject, conscious-unconscious relationships, qualifies as a problem of such supreme difficulty.
feeding his partial insights into various memory systems. However, in the process the patient will generate a number of duplicate memories, each with somewhat different tags, producing some further temporary confusion at times that will ultimately lead to improved retrieval and a basic reorganization around the reclassification of memory tags (which includes the category, not categorized yet!).

Attention requires instructions from the prefrontal cortex, that part of the brain most often connected with working memory (Crick and Koch, 1992; also see Barinaga, 1997). Gedo’s patients necessarily activate their working memories in order to expand their knowledge because it is only within working memory that memories become capable of reinterpretation by the self. Based on the research of Posner (1995) and Lassen (1994), Levin (1997a, 1997b) suggests that one reason engaging the transference is often crucial for psychoanalytic learning is that the free association and spontaneity associated with transferences activate specific blocks of working memory, thus facilitating learning.

The philosopher Searle (1995) raises thoughtful philosophical objections to the various propositions of top-down theorists. However, the downside of his own efforts is that along with Eccles (1973) Searle believes consciousness to be fundamentally mysterious, by which he means unknowable. This, of course, puts consciousness research outside the reach of science, but safely within the bounds of philosophy. Additionally, Eccles asserts that only the left hemisphere has consciousness! We believe with Sperry and Zaidel (1977) that a more plausible and parsimonious conclusion would be that both hemispheres are capable of consciousness, but that the left hemisphere particularly communicates its experience in words whereas the right hemispheric output is nonverbal and thus often ignored (especially by the left).

Finally, we mention Czikszentmihalyi’s (1975) proposal that one phase of conscious experience (not further specified neurophysiologically) is associated with relaxation, joy, energy, and self-confirmation, something he colorfully denotes as flow (see also Crook, 1988, p. 355) and something that we would locate more with the right hemisphere (Damasio et al., 1994; Schore, 1994). Czikszentmihalyi (1975) believes that disrupted flow interferes with consciousness, that is, consciousness is the experiential aspect of successful ECN activity. If optimal ECN functioning coincides with pleasurable feelings of self cohesion, intentionality, autonomy, and protected privacy, then nonoptimal ECN activity coincides with temporary disruptions of consciousness and secondary disturbances in mood (including shame).

Synthesis and Summary

We have discussed consciousness and its relationship to the ECN, suggesting that the set of functions of the anterior cingulate gyrus shows a key relationship
to both conscious and unconscious processing. In doing so we appreciate that we run a risk of confusing some readers by appearing to confound the cognitive nonconscious with the Freudian unconscious. From our perspective, however, these are clearly related but different domains which require a separate treatment.

What follows summarizes our discussion of consciousness, the ECN, and our various speculations about Gedo’s clinical experience with those rare analysands who suffer disturbances of consciousness.

Although no consensus exists, Levin (1997a, 1997c) believes that there are significant areas of agreement about the likely functions of consciousness. At the lowest level of brain activity, memories are in all likelihood categorized, stored, and maintained by both conscious and nonconscious means. This resembles what for computers is the dumping of old cache files, performing other cleanup and editing, and otherwise making room for new information while maintaining old information in a retrievable format. It makes sense that the conscious component of this level of control is for the purpose of categorization, just as Shevrin (1992) posits, so the data bases of mind/brain are usable on-line.

At an intermediate level consciousness is allowed to fluctuate in a never-ending dialectic between the brain’s purposeful search for specific goal-related input and the priming effects of input on the brain’s goal system. Levin and Kent’s (1995) cybernetic model of the brain accounts for such activities and requires an ECN with two inputs: goal priorities and feedback about motor output and current states. Kent’s model seems closest to “attention for action” (Dehaene et al., 1994, p. 304).

Finally, at the highest level of organization conscious mechanisms appear to prevail as the sine qua non for the on-line functioning of human hypercomplexity. Hypercomplex functions require networks which expand according to the scope of the task, rapid access to the most sophisticated data bases of mind/brain, and a subtle kind of decision making that only consciousness of the human variety has evolved to accomplish.

Starting with the work of Gedo, we have examined how trauma early in life can result in PTSD with decisive changes in cognitive development, error correction, association of memory (organization of mind/brain data bases), and management of conflicts. Along with many other kinds of interventions, psychoanalysis is then needed to restore normal functioning (Pally, 1997; van der Kolk, 1997).

A logical corollary seems to be that normal ECN functioning results in a quality of individual consciousness which, when shared with others, becomes a decisive part of the glue in relationships in general. In the end, of course, consciousness of community and optimal emotional and cognitive development influence each other (Levin, 1991).

We thus offer the following set of explanations for the fluctuations in consciousness that Gedo observed in the three of his 67 patients who suffered PTSD:
(1) PTSD-induced damage to autonomy; (2) disturbance of metacontrol; (3) alteration of ECN functioning or the function of the anterior cingulate gyrus; (4) disturbed tagging of memories alters memory retrieval; (5) malfunctions of the ECN, including damage to the hippocampus especially, alters mind/brain data bases; and (6) the general loss of flexible (higher level) patterns of analysis. It should be clear that points (3), (4), (5), and (6) could also be seen as attempts to specify precisely the nature of metacontrol disturbances.

Of course, in highlighting neurocognitive mechanisms, we know that we certainly appear to diminish the importance of traditional psychoanalytic perspectives (Wilson et al., 1990; Gedo, 1995). To some degree this is correct; however, we feel that there is simply no need to find analytic explanations for everything.

By describing details of the ECN, we also hope to assist analysts in better identifying the relationship between the felt experience and the patterning of particular cognitive functions. The functions involved include attaching, zooming, detaching, associating, error detection, and scanning mind/brain data bases. If looked for clinically, these patterns should be identifiable, leading to additional empirical knowledge about how best to facilitate their operation psychoanalytically.

Finally, as Einstein suggested, the most incomprehensible thing about the universe is that it is comprehensible! In this very sense we are surprised and pleased that our delineation of some of the design features of mind/brain that bear upon the uncontrolled clouding of consciousness in patients with PTSD, seems comprehensible in terms of intelligent shifts between conscious and unconscious systems under the control of a precisely specifiable ECN.

References


Are Mental Functions Hierarchical?

ARNOLD H. MODELL

This essay does not conclude with a definitive answer to the question raised in its title; it is more of an exploration of the question, Are mental functions hierarchical? What I present is part of a continuing dialogue with John Gedo. As he probably recognizes from my review of his books over the years, I have had some reservations regarding the concept of hierarchy as applied to the model of the mind. I have had the intuitive sense that mental functions may not be ordered hierarchically. Or, if they would be hierarchical, then what exactly this means needs elaboration. However, one’s critical faculties must rest on something more than intuition, so this essay also represents a dialogue with myself, an attempt to uncover why the concept of hierarchy troubles me when it is applied to mental functions.

At the outset it should be stated that in our contemporary, highly pluralistic, conceptually divided, psychoanalytic culture, John Gedo and I share very basic values. We both believe that psychoanalysis is biologically rooted, but in addition we believe that the biology of psychoanalysis should be brought up to date. That is to say, it should be consistent with what is known of the functioning of the brain at the end of the twentieth century. It would be a depreciation of Freud’s achievement to do anything less. We also share another basic value—we have never shied away from treating disturbed and disturbing patients psychoanalytically. Those of us who have had this experience will think differently about psychoanalysis; it is an antidote to any tendency toward preciosity.

Hierarchical concepts pervade biological thinking. Biology encompasses a multitude of hierarchical levels, including macromolecules, genes, cells, tissues, organs, individuals, population dynamics, and so forth. Indeed the eminent evolutionist Ernst Mayr (1997) notes that it is the hierarchical organization of living systems that clearly differentiates the animate from the inanimate. He observes that these hierarchically ordered systems with many emergent properties are never found in inanimate matter. The term hierarchy is of course a metaphor, and it is
of some interest to note that it is of religious origin. According to the literary critic Harold Bloom (1996) the word hierarchy was invented by a fifth- or sixth-century neoplatonist, who called himself Dionysius. As is true today, the term hierarchy was used as a means of forming categories. However, the items that were so categorized were not biological elements, but angels. Dionysius categorized nine orders of angels, in groups of three, from higher to lower ranks.

The concept of hierarchy was placed in an evolutionary context and applied to mental functions by the social evolutionist Herbert Spencer and the neurologist J. Hughlings Jackson. Jackson shared with Freud a penchant for broad biological theorizing, and Freud (1891) acknowledges that he was significantly influenced by his ideas. Stanley Jackson (1969), a historian of psychiatry, traced the collaboration between J. Hughlings Jackson and his friend Spencer. J. Hughlings Jackson’s evolutionary theory seems more Spencerian than Darwinian. Spencer introduced the idea that there is always some disintegrative activity in any integrative process and vice versa. Stanley Jackson observed that the notion of disintegration, a reversal of coherence, may have been prompted by the fact that both Spencer and J. Hughlings Jackson suffered form certain unspecified nervous disorders. A nervous disorder was seen as an example of a disintegrative activity. Spencer further believed that each step in mental evolution results in a faculty by which simpler preexisting faculties have their respective actions so combined that each aids in regulating or controlling the others, and the actions of all are harmonized. Incidentally, Stanley Jackson believes that Freud’s concept of regression was in part derived from J. Hughlings Jackson’s hierarchical theory.

J. Hughlings Jackson applied these Spencerian ideas to the function of the central nervous system with the implicit assumption that nervous centers were ordered on a developmental continuum from the lowest reflex center to the highest center of voluntary control. In addition to this developmental ordering, there is also a phylogenetic ordering in the central nervous system from the oldest premammalian structures to the most recently acquired. J. Hughlings Jackson claimed that when one ascends this hierarchy one moves from the most organized to the least organized. I find the term organization misleading. I believe what Jackson was referring to was an involuntary/voluntary axis; reflexes are involuntary whereas higher functions are volitional. A reflex system could be said to be organized in that reflexes are fixed as compared with the unlimited potential of voluntary action. In addition, as one ascends this neurological hierarchy, one moves from the simple to the complex. In disease processes, Jackson believed, the most recent evolved functions would be effected earlier than older, more primitive functions.

Jackson’s hierarchical theory was not intended to merely establish descriptive categories, for it also attempted to explain the functional interrelationships between different hierarchical levels. Jackson may have been giving voice to the
prevailing idea of biologic development at the time, namely, that any stage in
development is in part controlled by the previous stages (Mayr, 1997, p. 172).
J. Hughlings Jackson states: “the higher nervous arrangements evolved out of
the lower keep down those lower, just as a government evolved out of a nation
controls as well as directs that nation.” One immediately recognizes that this
formulation has had a pervasive influence on psychoanalytic theorizing. Freud’s
structural theory contains similar phylogenetic and developmental assumptions:
the phylogenetically primitive id is controlled by the evolutionary more advanced
ego and superego.

In his recent book Hierarchical Concepts in Psychoanalysis written with
Arnold Wilson, John Gedo (Wilson and Gedo, 1992) recounts how he and Arnold
Goldberg came to formulate their hierarchical Models of the Mind. He acknowl-
edged that he was influenced by David Rapaport’s magisterial contribution—
The Organization and Pathology of Thought (Rapaport, 1951). There he “en-
countered Rapaport’s insistence that developmental psychology must be under-
stood as an epigenetic sequence organized in a hierarchical manner.” In turning
to this text, I discovered that Rapaport’s theory of thinking repeated Jackson’s
model of the functional interrelationships of hierarchical levels.

We have assumed that the organization of cathetic energies is a hierarchy in
which the forces of the basic energy distribution are controlled by a superim-
posed one arising from it, which in turn gives rise to another set of forces
which are then similarly controlled, and so on; we assume that thought-
organization also follows this hierarchic layering [p. 703].

I cite this to illustrate the exceedingly long shelf life of these nineteenth century
concepts. I should add that Gedo does not appear to subscribe to this aspect of
Jacksonian theory.

What then is still acceptable in this hierarchical concept that influenced Freud
and to some extent shaped psychoanalytic theory? Do we still believe that the
temporal sequence of development can be categorized hierarchically? I am
troubled somewhat by the image of an orderly sequence of development in that
we know that in accordance with Freud’s concept of nachträglichkeit experiences
are normally recontextualized. In this sense developmental sequences do
not have points of closure. Nevertheless there are levels of functioning that ex-
tend from the primitive to the more advanced which we describe as higher and
lower. But is it correct to characterize this developmental sequence as a move
from the simple to the complex? If one turns to recent research in the area of the
infant’s cognitive and motor development, one discovers that the primitive learn-
ing processes in the infant are enormously complex. For example, a book by the
developmentalists Thelen and Smith (1994) describes the enormously complex,
nonpredictable, and emergent aspects of infant development. These authors
employ complexity theory and systems theory, as well as neurobiology, to con-
struct a paradigm that will begin to do justice to their observations. Psychoanalytic infant research also emphasizes the complexity of the mother/infant dyad and the fact that we have underestimated the infant’s capacity for symbolic representation (Gergely, 1992). From this it can be judged that the reflex arc model has little or no relevance to early infant development.

There is, however, another aspect of J. Hughlings Jackson’s hierarchical theory that seems to me to be still relevant. I believe that the developmental and phylogenetic succession of involuntary to voluntary mental processes can be thought of as hierarchical. But this is a very ancient observation known to Aristotle and later elaborated by St. Thomas Aquinas, who observed that volition was a peculiarly human trait (Aquinas, 1264). One can think of this hierarchy, perhaps more accurately, as a continuum of degrees of freedom from current inputs whether from within or without. But I am still left with the uneasy feeling that from evolutionary perspective our brains do not reflect an orderly ladderlike hierarchy with more advanced structures superceding the more primitive. We must remind ourselves that the God of evolution was a tinkerer rather than an engineer.

Affect communication in humans, as you know, may be voluntary or involuntary. We think of the mature individual as one who is able to delay, restrain, and voluntarily control affective communication. Yet we also know that when we are confronted with grave danger it may be impossible not to scream. In chimpanzees, however, the communication of affects is always involuntary. When chimpanzees, our genetically closest neighbor, are emotionally aroused, they cannot suppress their vocal cries. Jane Goodall writes:

Chimpanzee vocalizations are closely tied to emotion. The production of a sound in the absence of the appropriate emotional state seems to be an almost impossible task for a chimpanzee. Goodall goes on to describe that on one occasion when Figan [a chimpanzee at the Gombe Stream Reservation] was an adolescent, he waited in camp until the senior males had left and we were able to give him some bananas (he had none before). His excited food calls quickly brought the big males racing back and Figan lost his fruit. A few days later he waited behind again, and once more received his bananas. He made no loud sounds, but the calls could be heard deep in his throat almost causing him to gag [quoted by Lieberman, 1991, p. 52].

It can be said that Figan, although he remembered the past, was bound to the present. This observation accords well with Gerald Edelman’s distinction between primary and higher order consciousness (Edelman, 1989). Primary consciousness is the remembered present; perceptual inputs evoke specific categorical memories; and primary consciousness can then be described as episodic scenes, strung together like beads in a necklace. Higher order consciousness is a many-layered consciousness which enables the individual to create a model of past, present, and future, thus freeing one from the tyranny of ongoing events. This
schema or internal model of past, present, and future provides a sense of continuity and coherence which could be described as the biological self. The sense of self as an organizing, coherent-making, and meaning-generating agency is either absent in primates or present in only a very rudimentary form. These observations then support the idea of a functional hierarchy where higher mental structures provide for a freedom from the tyranny of immediate perceptual inputs.

The linguist Derek Bickerton has proposed a similar idea. He contrasts two basic modes of thinking that he calls on-line thinking and off-line thinking. On-line thinking focuses on the immediate environment. He defines on-line thinking as computations carried out only in terms of neural responses elicited by the presence of external objects, whereas off-line thinking involves computations carried out on more lasting internal representation of those objects. Bickerton (1995) also believes that some primates and dolphins have a protolanguage, but it is a language that lacks syntactic structures which does not enable them to go off-line. For Bickerton, the discontinuity between ourselves and other species, that which makes us uniquely human, is our generative grammar that allows us to go off-line.

My studies of metaphor have also led to a similar conceptualization (Modell, 1997a, b). I have suggested that there are two broad classes of metaphor—one involuntary and the other voluntary—which, from a hierarchical point of view, makes the involuntary metaphor lower (more primitive) compared with the voluntary metaphor that is higher (less primitive).

As some of you may realize, there has been a revolution in our thinking about metaphor initiated by the work of certain linguists and philosophers of language. (Johnson, 1987; Lakoff, 1987). Metaphor is now viewed not as a figure of speech but as a primary mode of thought. Levin (1991) considers a metaphor as the mind/brain’s means of integrating across varying times, sensory modalities, and developmental modes. Metaphor belongs fundamentally to the category of mind. It is by means of metaphor that we generate new perceptions of the world, and it is through metaphor that we organize and make sense out of experience. I have claimed that metaphor is the currency of mind (Modell, 1990).

At the heart of the definition of metaphor is the idea of a transfer of meaning between different conceptual or perceptual domains. As psychoanalysts we are concerned with the transfer of meaning from the present to the past and from the past to the present. Metaphor serves as a mediating link between these two different realms. As I mentioned, I have described two broad classes of metaphor: involuntary and voluntary. I have called involuntary metaphors frozen metaphors. When experiences are affectively salient, the memory of the experience is reevoked as a gestalt when there is a metaphoric correspondence between current perceptual inputs and old affective memories. Metonymic associations serve as trigger points, a part substituting for the whole. Transference repetition
is perhaps the most immediate example of this. We are all familiar with the fact that a metonymic association to a particular or singular aspect of the analyst in the here and now will trigger a global belief that the analyst is identical to the analysand’s archaic object. This involuntary transfer of meaning from the past to the present explains the sense of the irrationality of transference affects. There is a transfer of meaning from the domain of the past into the very different realm of current time, resulting in the sense that something irrational is taking place.

You recall that the essence of metaphor is the transfer of meaning between different domains. When metaphors are frozen, the correspondence between different domains is fixed and invariant, so that meaning is also fixed and invariant, whereas in open metaphors, the meaning is ambiguous. For example, the metaphor sex is the poor man’s opera is open to individual interpretation. In an open metaphor, there is a play of similarity and difference that is absent in frozen metaphors. In this sense open metaphors are not involuntary in that our imagination enters into the metaphoric process. The novelist Walker Percy (1975), in discussing metaphor, observed that there is a space between the name and the thing that allows the individual to make mistakes in understanding. It is these mistakes or purely personal apprehensions that introduce a measure of freedom and create new forms of understanding. To state it another way, metaphor opens the door of the imagination, and it is imagination and not merely language that makes us uniquely human.

Returning to the example of the transference, when transference is in the process of being at least partially resolved, there is a sense of playing with the similarity and difference between the perception of the analyst in current time and the imago of the past. We think of the move from transference repetition to transference resolution as a move from lower to higher mental functioning. Similarly the progression from frozen to open metaphor is seen as a move from a lower to a higher mental function. That frozen metaphors represent a lower mental function is supported by the observation that in severe illnesses such as schizophrenia, there is loss of what has been described as symbolic functions. It is more accurate, however, to speak of a retreat to frozen metaphor with meaning fixed in involuntary associations. This process can also observed in cases of massive trauma. A well-known example from a schizophrenic patient was provided by Hanna Segal (1957) in her “Notes on Symbol Formation.” She described a schizophrenic patient who stopped playing the violin. When his doctor inquired why he had done so, he replied: “Why? Do you expect me to masturbate in public?”

But we should not conclude that so called “higher” mental process are necessarily “good” or that “lower” mental processes are necessarily “bad.” In cases of trauma, it is of evident adaptive value to find an invariant metaphoric correspondence in current experience with the memory of the traumatic event. We may think of a developmental hierarchy, but the crucial issue is the context in
which the particular function is used. I am reminded here of a comment of William James who also recognized that different forms of mental functioning emerged in different periods of development. These modes of mental functioning, he said, must be viewed as tools or instruments dealing with particular tasks and that one was not intrinsically better or worse than the other (cited by Wertsch, 1991).

William James’s advice can be usefully applied to the concept of primary and secondary process thinking. From one perspective, Freud’s distinction between these two modes of thinking is ordered developmentally. The mode of primary process of thinking in dream formation Freud viewed as a regression to an earlier form of mental functioning, where hallucinations substitute for perception. Secondary process thinking, which involved the function of delay and attention to the reality principle, could be seen as a higher, more mature mode of mental functioning. Freud conceived of the secondary process as developmentally more advanced ego function which bound the irrationality of the primary process. Yet it is almost universally recognized that creative thought must utilize the primary process and not be under the control of the reality principle, so that we have come to think of the relation of the primary to the secondary process somewhat differently than Freud envisioned. It is not a matter of the control of a more primitive function by a more advanced function, as J. Hughlings Jackson proposed.

One thinks instead of Ernst Kris’s valuable formulation—regression in the service of the ego. Kris described that in creative thought there are rapid shifts between different levels of psychic functioning (Kris, 1952). Kris’s concept of regression in the service of the ego is not at all consistent with the Jacksonian hypothesis that higher centers of mental functioning inhibit the lower centers. What Kris suggests is that creativity, our most advanced mental function, requires an open and synergistic relation between what I would think of as different levels of consciousness (as exemplified by the use of frozen and fluid metaphor.)

When applied to the brain, Jackson’s hierarchical functional theory appears today to be controversial. The eminent Russian neurologist Aleksander Luria affirms Jackson’s hypothesis that the more recently evolved structures of the brain, such as the prefrontal cortex, are indeed more complex and do serve an inhibitory function (Schore, 1994).

Neurophysiologist Paul MacLean (1990) wholeheartedly adopted Jackson’s theory in The Triune Brain in Evolution. MacLean described the brain’s organization as hierarchical structures representing three evolutionary levels described as the protoreptilian, the paleomammalian, and the neomammalian. The protoreptilian formation is represented by the midbrain and basal ganglia, together with a thin shell of cortex including the hippocampus. Surrounding this core is a ring of cortex and striatum found in lower animals and identified with
the limbic system, whose function, MacLean states, is to amplify the intensity of feelings. The newest structure, the neocortex, which balloons out in Homo sapiens, provides for the capacity for language and culture.

By implication, the neocortex, the seat of reason, controls the more primitive old mammalian limbic system. “Each brain has its own peculiar form of subjectivity and its own intelligence, its own sense of time and space and its own memory, motor and other functions” (Freeman, 1995). The main task of the neomammalian brain is to control the impulses of the paleomammalian brain and the blind territorial ambitions of the reptilian brain. Neurobiologist Walter Freeman criticizes MacLean for carrying the nineteenth-century baggage of Jacksonian theory. I agree with this criticism that MacLean uses Jacksonian concepts to separate reason from emotion and to suggest that rational behavior is “better” than emotional behavior. We cannot forget that our rational view of the world owes its existence to the sometimes irrational passions of individuals and that reason can be used to further unspeakable consequences.

In closing then, my answer remains inconclusive to the question: Are mental functions hierarchical? I have tried to show that mental functions are always context driven so that we must avoid attaching value judgments that equate the “higher” more mature function with what is better and the “lower” more primitive function with what is worse. Freud did assume that recall through narrative memory was better than action, and by implication, verbal communication is better than nonverbal, preverbal, or paraverbal communication (Freud, 1914). I would repeat the wisdom of William James (1977) who said that mental functions must be viewed as tools or instruments dealing with particular tasks and that one was not intrinsically better or worse than the other.

John Gedo’s contributions to psychoanalysis have led to the reexamination of some of our most fundamental and basic theoretical assumptions. In this fashion, he has provided an invaluable service to psychoanalysis.

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The Transformation of Past Experiences

ARNOLD H. MODELL

The fact that experiences within the analytic relationship, in real time, can alter affective memories of the past should be a cause for wonder. This essay is an attempt to focus in greater detail on this still somewhat mysterious process. I do not present any new clinical observations, but rather discuss familiar aspects of the psychoanalytic process from a somewhat different perspective, a perspective that has been influenced by Gerald Edelman’s (1987, 1989, 1992) contribution.

Psychoanalysis has long been viewed as a method through which an individual could be relieved of the burdens of the past. We know that the compulsion to re-create, painful past experiences in current time is a major source of neurotic suffering. Of course, nothing can change what objectively happened in the past; what can be changed is the affective component that the patient carries within as living history (Loewald, 1980). Such transformations are the antithesis of an involuntary repetition of the past. The intersection between the present and the past in psychoanalysis is mediated through the transference, which selectively activates specific aspects of old relationships so that the past is experienced in the present. We know that these memories of the past may be admixed with fantasy. But inasmuch as I intend to explore the interface between psychoanalysis and neurobiology, I focus on memory and assume a traumatic model of psychopathology—that past experiences are actual. For the purposes of this presentation, I bracket the important subject of fantasy, for an exploration of fantasy will take us too far afield.

Frank Bidart, the poet, has spoken of the tragedy of untransformed givens, and we all know what beginning psychoanalysts soon recognize—that there are limits to what can be transformed by means of psychoanalytic treatment. In 1896 when Freud was still viewing neuroses as traumatic in origin, he observed that psychopathology represents, at bottom, a failure of the retranscription of memory. What we ultimately suffer from, Freud believed, is not the events themselves but our inability to transform the memory of those events.
I have suggested that metaphor is an essential element in the transformation of traumatic memories and, further, that the metaphoric process provides the necessary bridge between the past and the present: memory. By means of this process, metaphor and affects are synergistically linked (Modell 1997a, b; see also Levin, 1991). When there is a compulsion to repeat the past, as in traumatic memories and in transference repetition, the space between the present and the past is narrowed—past and present become undifferentiated. There are times when aspects of the affective bond between the self and other in the present are experienced as a total re-creation of a scene with actors from the past. When this occurs, the individual may feel as if they have fallen into a time warp: they experience a kind of circumscribed craziness in that the present is experienced as identical to the past. We believe that the correspondence between present and past has been fixed by means of frozen metaphors. From this point of view, one aim of psychoanalytic treatment is to convert these frozen metaphors into fluid, generative metaphors.

A deeper understanding of the relation between memory and metaphor was made possible by recent contributions of researchers outside of psychoanalysis. A short list of those who have revolutionized our thinking about metaphor and memory would include the linguist George Lakoff (1987), the philosopher of language Mark Johnson (1987), and the neurobiologist Gerald Edelman (1987, 1989, 1992).

For centuries metaphor has been thought to be a figure of speech, merely a trope, that adorned and enriched language. It was a subject that could be classified under the heading of rhetoric. Metaphor was then a specialized subject, a topic of investigation for linguists, literary scholars, and philosophers of language who were concerned with the problem of nonliteral meaning. Until recently, most of these scholars accepted Aristotle's definition of metaphor, equating metaphor with analogy. Aristotle viewed metaphor as an adornment of speech conferring a certain elegance and beauty of style. If metaphor had continued to be understood only as a trope, the subject would have little interest to those of us who are students of the mind.

Recently, however, there has been a revolution in our understanding of metaphor. In retrospect it appears that scholars have been guilty of what philosophers call a category mistake, for metaphor belongs primarily to the category of the mind/brain and only secondarily to the category of language. Metaphor is a basic and primary element of thought; it is the currency of mind, the process through which meaning can be transferred between different domains and thus transformed. Therefore, metaphor should be viewed as central to the concerns of neurobiology, cognitive science, and psychoanalysis.

Aristotle was not entirely wrong in describing metaphor as an analogy, but an analogical correspondence is only the first step in the metaphoric process; the essential second step is the transfer of meaning from one domain to a dissimilar
domain. In the broadest sense, metaphor is a template by which we parse complex, unfamiliar experiences onto the familiar (Holland, 1995). This is one of the fundamental tasks of our brain and mind. I have proposed that there are two broad classes of metaphor: metaphors that can be described as frozen, foreclosed, or fixed and metaphors that can be described as open, fluid, and generative. The former are phylogenetically and developmentally more primitive. When metaphor is frozen, the metaphoric process is involuntary and automatic. Meaning is transferred between different domains, but the metaphor itself is unambiguous whereas fluid metaphors are ambiguous so that the attribution of meaning is not involuntary but a function of the self (Modell, 1997b). The process is no longer involuntary in that the self enters into what is perceived. Meaning not only is transferred to a dissimilar domain, but it is also transformed by the imagination. The metaphoric process, in this latter case, is the means through which new apprehensions of the world become possible; it is the business of metaphor to break open and extend the categories of our thought (Turner, 1988). The pervasiveness of metaphor in language reflects this fact that metaphor is fundamental to the way we experience the world.

I plan to show that memories of intense emotional experiences are templates that are coded in current time by means of frozen metaphors. Such memories do not stand alone but are members within a category of experience, a constituency gathered by means of metaphor. Experiential memories can be thought of as private metaphors in that they are not part of a shared public language. I have described this process as the formation of affect categories (Modell, 1990). Affect categories function as unconscious potentials for action that are created or reevoked when there is a metaphoric correspondence between current perception and categorical memories of the past. A familiar example is transference repetition, where meaning is mapped between the dissimilar domains of the past and present time. Transference metaphors are frozen in that the transfer of meaning between the times past and the present is unconscious and involuntary. The transformation of frozen metaphor into fluid or generative metaphor requires a complex state of consciousness which I shortly describe as the metaphoric mind.

The concept of an affect category derives in part from Gerald Edelman's theory of memory, which I now attempt to summarize. Edelman's (1989) theory of memory is revolutionary in that he proposes that memory is both categorical and retranscriptive. He said, "Until a particular individual in a particular species categorizes it in an adaptive fashion, the world is an unlabeled place in which novelty is frequently encountered. . . . Therefore the primordial task faced by the brain is that of labeling an unlabeled world" (p. 4). This is accomplished by means of perceptual and conceptual categories. It is evident that category formation is dependent on memory. For Edelman (1987) memory and category formation are nearly identical processes. He says, "A memory is the enhanced ability to categorize associatively, not the storage or
features of attributes as lists” (p. 241). Edelman suggests that memory and categorization rely on similar neuronal processes. Memory is not a store of fixed or coded attributes. Instead, memory consists of a process of continual recategorization, which must involve continued motor activity and repeated rehearsal (Edelman, 1989, p. 56). Perceptual categorization and the recategorization of memory depend critically on reentry. Reentry is defined as a process of temporarily ongoing parallel signaling between separate neuronal maps (Edelman, 1989, p. 56). These global mappings constitute a necessary substrate for relating categorization to memory. Reentrant processing of separate neuronal maps can be analogized to the communication that exists between members of a leaderless string quartet.

Edelman’s theory represents a sharp break with the traditional idea of memory as a storage system from which items are retrieved. Memory is not a process of retrieval from some static memory bank because the brain’s memory is not like that of a computer with its permanent memory into which items are entered and withdrawn. What the brain stores is not simply isomorphic with perception; experiential memory is actively selective in accordance with past memorial categories. Experiential memory exists as a latent potential that can be revived as an actual memory if current inputs, specifically metonymic associations, reevoke the original experience. One cannot claim that all memory is categorical, for memory may also be domain specific, for example, our memory of faces is not categorical. There is a distinction between experiential memory and what has been called semantic memory, the memory of acquired impersonal knowledge. These two forms of memory activate different neural circuits (Vargha-Khadem et al., 1997). As psychoanalysts we are not privileged observers of semantic memory in that we primarily observe autobiographical, experiential memory which, I am virtually certain, is categorical.

The idea that memory is retranscriptive is not entirely new as this observation was intuited by Freud (1896) as shown in his concept of nachträglichkeit. That memory is retranscriptive was also noted by Sir Frederick Bartlett in 1932 when he said “Remembering is not the re-excitation of innumerable fixed, lifeless and fragmentary traces. It is an imaginative reconstruction” (p. 213). Neither Freud nor Bartlett understood memory, as did Edelman, to be both retranscriptive and categorical. Edelman’s theory of memory must be viewed in the larger context of his theory of neuronal group selection. For several years I have tried to demonstrate the importance of Edelman’s ideas for psychoanalysis. What is especially important for psychoanalysis is his fundamental assumption that the brain is formed through its interaction with the environment. For the developing infant, this not only means interaction with the Piagetian inanimate environment of stationary and moving objects, but also the human environment which is the infant’s mother and other caretakers. Edelman’s theory is congruent with a recent hypothesis that the infant and the mother form a self-organizing system that
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expands the infant’s state of consciousness (Tronick, 1998). It appears likely that the infant’s brain is sculpted through the infant’s interaction with their mother (Schore, 1994.) I cannot improve on Oliver Sacks’s (1990) comment on Edelman’s theory of neural Darwinism “that the brain reflects the life experience of each individual human being. So that will, sensibility, moral sense and all that one would call personality and soul becomes engraved in the nervous system” (pp. 44–50).

I now provide some clinical examples of affect categories. Affect categories are ubiquitous so that any analyst can provide similar illustrations. The following affect category was the consequence of a single traumatic episode. A patient reported that when he was about two or three years old his mother had a spontaneous miscarriage. He was able to reconstruct that in all probability his mother became “hysterical” and was emotionally distraught for an undetermined period of time. As a witness to these events, he felt as if his mother had gone crazy. As an adult he was very tolerant of craziness in women if he was not attached to them, but any sign of irrational thinking on the part of a woman to whom he was dependent, such as his wife, made him extremely anxious. This unconscious affect category was that of woman’s irrationality limited to women on whom he was dependent. This past affective experience is activated and re-created in real time by means of a metonymic association. At the moment when he was responding to his wife’s “irrational” behavior, the distinction between past and present was obliterated.

The following illustration is that of chronic and cumulative trauma that resulted from a father’s devastating illness. A female patient’s loving relationship with her father was irrevocably lost, when, in her early childhood, her father developed a brain tumor which led to the gradual deterioration of his personality and his eventual death. The affect category that was evoked could be described as the terror that ensued when she sought care and protection from someone who was incompetent. Forty-five years later, a metonymic association revived all the affects associated with her earlier relation with her father. The metonymic trigger, which substituted the part for the whole, was her observation that her male companion was driving slowly, overly cautiously, and, in her judgment, incompetently. She wondered whether he was developing brain damage and becoming precociously senile. She became enraged at him and then became guilty because of the irrationality of her reaction. The metonymic association, her friend’s overly cautious driving, evoked the entire scene from childhood with all its accompanying affects. The metaphoric correspondence between past and present is then experienced as an exact fit; there is only a sense of similarity and not of difference. To experience such an ensemble of feelings from the past in current time is a bit crazy making, as if one has momentarily fallen into a time warp.

I now turn to the subject of transference repetition. I recognize that the phenomenology of the transference is enormously complex and what I present is
simplified and overly schematic. My patient is imaginary because what I de-
scribe represents a composite of several patients. Trying to isolate single ele-
ments in a highly overdetermined process is analogous to a thought experiment,
but unlike the philosopher's thought experiments, it is one derived from the
experience of psychoanalysis. Let us then imagine, in schematic form, an inter-
action between analyst and patient that can be taken as emblematic. Let us con-
sider a female patient whose mother was depressed and emotionally absent for
the first three years of her life. Let us further imagine that I, during a given hour,
was momentarily withdrawn and inattentive. This action on my part served as a
metonymic association, where a part substituted for the whole. This metonymic
association served as a trigger which evoked a global response in the patient. It
can be said that metonymy reconstructed a categorical memory. She then per-
ceived me as identical to her mother in every possible way. My patient com-
plained not only that was I withdrawn and inattentive as was her mother, but
also as her mother, I had no insight or empathy and did not understand who she
was, or anything about her, despite the fact that we had been working together
for many years. I initially responded as I would to someone in everyday life who
was angry and accusatory and in addition caused me to view myself as some-
boby I did not wish to be. Of course I privately rejected the observation that I
was totally without empathy and did not know who she was. I did not say any of
this, but did admit that I was in fact inattentive in that particular hour. However,
in her reaction to my inattention, she experienced only the similarities to her
mother and not the differences; she perceived me as identical to her mother in
every detail. This intervention could be described as a transference interpreta-
tion at the height of affective urgency, saying in effect, "I am not your mother."
You will recall that Strachey, many years ago, noted the transmuting effect of
such transference interpretations. He believed that such interpretations given at
the height of affective urgency established the _difference_ between the immediate
object of the analyst and archaic object. The very act of making an interpreta-
tion, apart from its content, differentiated me from her mother.

I intend this clinical fragment to illustrate that transference repetition can be
understood as a frozen metaphor which is evoked by a metonymic association to
some aspect of the analyst in current time. Further, and this is the point I wish to
emphasize, the focal point, or leading edge, of the process we describe as the
resolution of the transference is a complex state of consciousness that accepts
the simultaneity of sameness and difference. It is this oscillation of sameness
and difference that characterizes the fluid in contrast to the frozen metaphor. As
we know, by simply doing their job analysts demonstrate that they are different
from the patient's archaic imagoes. Innumerable repeated small steps accomplish
this over time. During this process of "resolving" the transference, both analyst
and patient share in a complex state of consciousness which recognizes the si-
multaneity of sameness and difference.
We must then examine further the origins and components of this multi-layered consciousness which allows one to accept the apparent paradox of the simultaneity of sameness and difference. I call this the *metaphoric mind*. For those patients who cannot accept this paradox, who cannot utilize their metaphoric mind, the experience of the past remains unchanged, and their view of the analyst remains fixed. The analyst’s presence evokes an involuntary affect category in which only the similarity between the past and the present is perceived. The analyst’s attempts at interpretation or their demonstration through their actions of the difference between the past and present is totally ineffectual.

To return to our imaginary patient, let us assume that, unlike her mother, I showed by my actions and by my tone of voice that I was emotionally responsive to her, yet the patient retorted—"I really know intellectually that your are not my mother, but you feel like my mother." The patient’s state of consciousness lacks the complexity of the metaphoric mind and remains one dimensional, perceiving sameness but not difference.

The differentiation between fixed associations and a freely expanding imagination is not a new idea as something analogous was observed in the first quarter of the nineteenth century by the poet and critic Samuel Taylor Coleridge (Richards, 1969). Coleridge contrasted two states of consciousness: one he called *fancy* and the other *imagination*. In the state of consciousness described as imagination, the mind is growing, whereas in fancy it is merely reassembling products of its past creation, ready made from the law of association. Imagination consists of the coalescence of subject and object. "Into the simplest seeming datum a constructing, forming activity from the mind has entered. The self has gone into what it perceives, and what it perceives is, in this sense, itself. So the object becomes the subject and the subject the object" (p. 57). In summary, Coleridge described the oscillatory state of consciousness, the simultaneity of sameness and difference, that is an attribute of the metaphoric mind.

I have suggested that the transformation of past experiences require the complex, multileveled consciousness characteristic of the metaphoric mind. I hypothesize further that this complex state of consciousness comes into play when the environment is relatively safe. When the environment is perceived as unsafe, when there is a threat to the cohesion or continuity of the self, consciousness becomes one dimensional. The conditions of safety, essential to the metaphoric mind, need to be understood both from a developmental and evolutionary perspective.

As a developmental hypothesis, I propose that the origin of the metaphoric mind can be traced to the safety of the mother–infant dyad, what Winnicott metaphorically described as the holding environment. The holding environment is essentially a caretaking environment, which, if functioning adequately, creates a sense of safety in the world. Although the infant responds to the inanimate environment, to light and darkness, to sounds, to moving objects, I agree with Marion
Milner (1957) who observed that "in the beginning one’s mother is literally the whole world" (p. 116).

As noted earlier, these environmental inputs shape the architecture of the developing infant’s brain. As I later describe in greater detail, within the safety of the holding environment, during the first year of life, the infant begins to experience the paradox of the coexistence of similarity with and difference from their caretakers. Or to put it differently—the paradox of the coexistence of oneness and two-ness. These are, I believe, the preconditions for the later development of the metaphoric mind.

In describing the contribution of the holding environment to the infant’s developing mind/brain, I am making certain assumptions regarding the brain’s plasticity. This subject is, as you know, quite controversial. For there is considerable debate regarding the relative significance of environmental inputs for the developing brain. My own position, and I suspect that of most psychoanalysts, is that environmental inputs shape the architecture of the developing infant’s brain. Those who attribute an inordinate influence to the fixed instructions of the DNA oppose this belief. This question of the brain’s plasticity has divided neuroscientists and cognitive psychologists into opposing camps. The controversy is essentially one concerning the extent to which the brain is thought to be genetically hard wired. There are those who give credeence to an overriding genetic determinism and consequently minimize the role of the internal and external environment in the development of the mind/brain (Lewontin, 1991). At present there is a resurgence of a reductionistic movement that attributes complex behaviors to the influence of genes. When combined with hard artificial intelligence, this belief can lead to a psychological naiveté reminiscent of behaviorism. For example, in a recent popular book titled How the Mind Works (Pinker, 1997), psychology is defined as the “analysis of mental software.” According to this view, thought is nothing but an algorithmic computation. We have those who believe that the fundamental processes of the mind works as algorithmic computations, and on the other hand, there are those of us who believe that the metaphoric process is fundamental, a process that is not limited to verbal elements but includes images and sensations as well. The position of psychoanalysts in this debate should be fairly clear.

The infant’s inanimate environment is one of light and darkness, sounds, and fixed and moving objects, but within this inanimate environment, there is another more compelling human environment. The infant is held and feels contact with the mother’s skin, feels her warmth and through proprioception continues to feel the rhythm of her heartbeat that was earlier sensed in the uterus. Her voice is also the familiar voice heard in the uterus. Central to the infant’s postnatal experience is the mother’s gaze; it is the mother’s face that the infant watches while nursing. If all goes well, the infant experiences a sense of safety.

From numerous observational studies of infants and their mothers, it can be inferred that within this holding environment, at some point during the first year
of life, the infant is conscious of simultaneously feeling similar to and different from his or her mother; the infant is conscious of union and separateness. Such infant researchers as Daniel Stern and Colwyn Trevarthen (Stern, 1985) observe that the infant can differentiate self from nonself almost immediately after birth. Trevarthen noted that the infant is actively curious in exploring its environment within minutes after birth. Stern reports his observation of Siamese twins who sucked each other’s fingers yet were able to differentiate their own hands from those of the other. These researchers believe that the infant is aware that it is the agent of its own actions. All these observations allow us to infer that the infant is aware of its separateness from the mother, yet there is another set of observations that point in a different direction. These observations suggest the inference that the infant may also experience a sense of coalescence or merging with the mother, an experience of sameness. This can be inferred from the process of affect attunement. Inasmuch as the mother attunes her affects to that of the infant and the infant attunes his or her affects to that of the mother, it is reasonable to suppose that at times the infant cannot differentiate what feelings belong to the self and what feelings belong to the mother. The contiguousness or contagiousness of affects that characterizes the mother–infant dyad is biologic given. It is something that we never outgrow, for at times as adults we also have the experience of not knowing whether feelings were placed in us by the other or whether they arise from within ourselves.

Edward Tronick (1998) and Colwyn Trevarthen (1989) have independently proposed not only that the infant’s and mother’s affects joined together but also that the infant’s and mother’s consciousness is conjoined. Tronick reports that there is evidence that the mother is part of the infant’s somatic regulatory system, for example, that contact with the caretaker’s body regulates the infant’s temperature. By analogy, he proposed that it is also true that contact with the mother’s mind, the mother’s state of consciousness, regulates the infant’s state of consciousness. The mother’s more advanced and more complex state of consciousness includes her awareness of her union with and separateness from her infant. This awareness reinforces a corresponding state of consciousness within the infant. This complex consciousness in the developing infant was also noted by Levin and Trevarthen (this volume). If affects and states of consciousness are shared and similar, yet at the same time the infant is cognitively aware that they are enclosed within the separate envelope of their own body, a complex consciousness of sameness and difference ensues. Again, I suggest that a necessary precondition for this complex state of consciousness is the safety of the holding environment.

This speculation that infants develop a complex, multileveled consciousness is supported not only by psychoanalytic observers but also by cognitive scientists, who report that the infant’s capacity for imaginary play appears between the ages of 18 and 24 months (Karmiloff-Smith, 1992). At this age the infant is able to differentiate objects as they are “in reality” from the same object
transformed by the child’s imagination—a block of wood can become a truck. Therefore the real and the imaginary must be simultaneously held in consciousness. Further, the infant or young child is aware of a metaphoric correspondence between the imaginary and the actual object.

If the metaphoric mind is an aspect of normal development, we would predict that a prolonged continuous disruption of the safety of the holding environment in the first and second year of life would impair the developing capacity for metaphoric thought. It is been noted (Schore, 1994) that prolonged stress produces elevated levels of corticosteroids which have an adverse effect on developing neural structures. Specifically, there are recent reports that the hippocampus shrinks under stress and that monkeys exposed to short periods of stress do not grow new hippocampal cells (Gould and McEwen, 1998). Therefore, it is not unreasonable to suggest that the stress of a prolonged disruption of the infant’s holding environment will interfere with the formation of those neural circuits that support a complex state of consciousness. This may result in an irreversible impairment of the metaphoric mind. Such impairment may help to explain why some patients suffering from severe early deprivation may prove to be unanalyzeable. To be sure, this is only a hypothesis, but one that can be confirmed or disconfirmed.

We know that the capacity to make use of psychoanalytic treatment is multidetermined, but among the myriad reasons why someone cannot make use of the analytic method, some patients cannot make use of psychoanalysis because of their incapacity to use metaphor. Inasmuch as there is a synergy between affects, memory, and metaphor, these patients also suffer from an inability to use emotions as signals to themselves (McDougall, 1980; Modell, 1985). Joyce McDougall described a category of psychoanalytic patients as “anti­analysands.” These are patients who at first appear to be suitable candidates for psychoanalysis, but as the work proceeds, one learns they are unable to make use of the analytic method because they lack a capacity for metaphoric thought. A common denominator in these cases may be severe impairment of the caretaking environment in the first or second years of life.

There is also evidence that when individuals are exposed to a massively unsafe environment after the formative years of childhood, they may also suffer a loss of the metaphoric capacity. For example, those who survived the Holocaust have reported that they have lived in a world that is beyond metaphor (Bergmann and Jucovy, 1982; Grubrich-Simitis, 1984). This loss of the metaphoric capacity may extend to children of survivors through a form of cultural transmission. This loss of the sense of safety appears to have been communicated from the inner world of the parent to the inner world of the child. How this process occurs is not clear. What characteristically develops can be described as a primary identification with the parents as victims. The parents’ memories and survivor guilt become as their own. In Other Times, Other Realities (1990), I reported such
cases and Bergmann and Jucovy also report numerous examples in which the children of survivors also suffer from a loss in their capacity to experience metaphor. There is an apparent loss in the capacity to experience the play of sameness and difference, especially regarding identification with the parents. Instead of the play of sameness and difference which normally occurs in the process of identification, the children experience total identification. For example, the child of a survivor, a college student, withdrew from all social contacts. Her father had escaped being murdered by the Nazis by going into hiding. This young woman was not simply behaving like her father when she withdrew from social contacts—she was her father in hiding. Bergmann and Jucovy also describe how this loss of metaphoric capacity can be reversed through psychotherapy.

In this essay I have focused on a familiar problem: how experiences within the analytic relationship can alter the affective memories of past. A traditional formulation of the therapeutic action of psychoanalysis, which most of us recognized as too pat to be to be adequate, is that affective experiences of the past are activated through the transference, which is then resolved by means of interpretation. The recent advances in linguistics and neurobiology have provided us with the tools for a more fine-grained microanalysis of this familiar process. Lakoff's (1987) and Johnson's (1987) work on metaphor, combined with Edelman's theory of memory, provides us with a powerful conceptual instrument with which to understand transference phenomena. Transference repetition can be understood as a focal freezing of metaphor, so that metonymic association to any aspect of the analyst in current time will evoke an automatic and involuntary response.

Patients who have suffered from extensive trauma have taught us that the freezing of metaphor can become a global rather than a focal response. As in the focal disturbances of a transference repetition, this is also accompanied by an altered one-dimensional state of consciousness—a state of consciousness is one in which there is difficulty in accepting the paradox of the simultaneity of similarity and difference. This absence of what we have called the metaphoric mind can be understood as an emergency measure in which ambiguity is a luxury that cannot be afforded in a dangerous world. The loss of ambiguity prepares one to meet present dangers, but there is price to be paid which is an inability to transform past experiences.

From an evolutionary perspective, responses that are fixed, automatic, and invariant can be thought of as more primitive. When we categorize the world in accordance with frozen metaphors and respond automatically, the agency of the self is relatively silent and inactive. This invariant and involuntary emotional response is something that we share with other species yet transcend at the same time. We are the only species with the capacity for metaphor. This capacity is part of what Edelman calls higher order consciousness. It is this higher order consciousness that frees us from the tyranny of internal and external inputs.
Edelman has discussed the adaptive significance of consciousness in his books *The Remembered Present* (1989) and in *Bright Air, Brilliant Fire* (1992). Possessing a higher order consciousness allows us to create a model of the world free from the inputs of real time. This freedom allows us to create alternative worlds of the imagination in which experience can be transformed.

References


Knowledge and Ignorance in Psychoanalysis

GEORGE MORAITIS

In 1986, Nobel laureate biologist Walter Gilbert referred to the Human Genome Project as "the grail of human genetics . . . the collective answer to the commandment 'know thyself'" (see Shattuck, 1996, p. 173). Gilbert's exuberant statement reflects the level of assertiveness and pride generated among the researchers in human genetics and biology as a result of their impressive discoveries.

Psychoanalysis as a profession has, by and large, been very slow in responding and investigating such claims. Many psychoanalysts have viewed biological research as irrelevant to psychoanalysis. Some others, in private exchanges, have characterized it as a cultural defense against introspection and the awareness of the unconscious process; they have prepared themselves for another long siege such as the one Freud encountered at the turn of the century. John Gedo is one of the few who have diligently worked to integrate biological research into psychoanalytic theory and practice. As far as I know, he is the only one who anticipated these developments long before they occurred.

In this essay, I address the difficulties that lie in the path of psychoanalysts who strive to incorporate into their clinical work and theoretical orientation an interdisciplinary perspective that takes seriously into account the knowledge generated by recent neurobiological research, cognitive science, and developmental studies. My essay is somewhat autobiographical, given the fact that I am still engaged in this struggle and have not as yet achieved the level of integration I have wished for. As a medical student, I had approached my studies in biology as the dues I had to pay to become a psychoanalyst, and I was delighted when I reached the point at which I could devote all my time to the understanding of the human mind, more or less to the exclusion of the understanding of the body.

I have, of course, always assumed that my interest and activities as a psychoanalyst are, for the most part, scientific. Like most of my colleagues, I have taken for granted the dual roots of psychoanalysis, namely, science and humanism,
but, until recently, I have not tried to define how well fused these two elements are.

During the last 25 years, Freudian metapsychology and its links with biology and the nineteenth-century scientific world have, for the most part, been discredited, and elaborate debates have taken place between those who dispute the scientific basis of psychoanalysis and those who defend Freud's claims for a place in the Weltanschauung of science. I have followed some of these debates, up to the point at which they become esoteric and obsessional in nature and removed from the activities of most psychoanalytic professionals. Perhaps this reflects more my personal limitations rather than the limitations of the issues involved, but I know I am not alone in feeling this way.

The introduction of neurobiological research into the field of psychoanalysis has provided a new pragmatic opportunity for psychoanalysis to reclaim its scientific status. How much of an opportunity remains to be seen. A good deal depends on the willingness of psychoanalysts to study the new discoveries in depth and to educate themselves in a technical field very different from the one with which they are familiar. Furthermore, psychoanalysts must entice neurobiologists to take a serious interest in psychoanalytic data and thus set in motion a process that can cross-fertilize both fields.

The intellectual arguments for and against the need for such an interdisciplinary exchange largely pertain to different definitions of what psychoanalysis is and what it is not. However, this is not the issue that I address in this presentation. Instead, I try to identify certain prevailing common denominators in the cherished values, identifications, and commitments of psychoanalytic professionals which have shaped their sense of self and their perceptual instruments as clinicians and thinkers. These common denominators will largely determine the readiness of psychoanalysis as a profession to enter into a meaningful and productive dialogue with the professionals from the neurosciences. Obviously there are important differences between one individual and another, but all members of the psychoanalytic profession have been deeply affected by the educational process they undergo, which is highly personal in nature and designed to instill in the student's mind certain group values and priorities.

Furthermore those values and priorities are being constantly reinforced—long after the candidate's graduation—through a system of rewards and punishments. Given these circumstances it is inevitable that a good deal of this input becomes internalized, as a result of which the members of the psychoanalytic profession acquire certain common characteristics in their value system and temperament. Many of them selected the profession of psychoanalysis because of their affinity with its values and temperament. For them the external input only reinforced what was already there. It is important, however, not to underestimate the influence of the culture within which psychoanalysts develop their ideas, convictions, and attitudes.
Psychoanalysts are the products of a carefully cultivated culture within the bounds of “free-standing” psychoanalytic institutes, as designed by Freud. These institutes not only aim to provide for their students maximal exposure to psychoanalytic knowledge, but they also shield the students from the forbidden knowledge that is deemed irrelevant or dangerous to psychoanalysis. Upon graduation, these same institutes become the professional home for the mature analyst, who strives to acquire recognition and a broader intellectual and scientific perspective. Despite the obstacles, some achieve their goals; however, when they attempt to import their new perspectives within the confines of these free-standing organizations, they usually encounter great opposition, which generally takes two forms.

The new perspective is either rejected as irrelevant to psychoanalysis, or accepted, but as simply another version of what is already known. In psychoanalysis all claims to novelty and discovery are viewed with great suspicion, and must be approached as rediscovery in order to receive a fair hearing. For example, the renewed interest in Freud’s “Project,” in response to the explosive progress in neurobiological research, may well constitute an effort to present the new information as psychoanalytic rediscoveries to make them more acceptable to psychoanalytic readers.

The extreme conservatism that characterizes psychoanalytic education, and the psychoanalytic profession in general, is particularly evident in the application of the psychoanalytic method. The “tool and method pride” (Kohut, 1975) which dominates the field of psychoanalysis is equally strong in all schools of psychoanalytic thought, and constitutes the single most prominent common denominator of most psychoanalysts’ sense of professional self.

There are very good reasons for psychoanalysts to be proud of this method. It is the instrument through which scientific data are collected, and its therapeutic effectiveness has been demonstrated repeatedly. In a scientific enterprise, however, the method should not be confused with the procedure. All sciences rely on the scientific method for the data they collect but utilize a variety of procedures in collecting such data. In psychoanalysis, only one procedure is considered legitimate, as a result of which little experimentation is possible, and valuable data are dismissed as irrelevant. A few years ago, I edited a volume of Psychoanalytic Inquiry (Moraitis, 1995) titled The Relevance of the Couch in Contemporary Psychoanalysis. It seemed to me rather paradoxical that, given all the changes introduced in psychoanalytic clinical theory during the last 30 years, no new rationale has been developed and no questions have been raised about the relevance of Freud’s original recommendation about the clinical setting in general and the use of the couch in particular. The eleven contributors to the volume represented a wide spectrum of theoretical orientations. None of the contributors claimed empirical clinical knowledge in conducting an analysis without the use of the couch for experimental purposes, although at least three of them
expressed the conviction that the traditional analytic setting may not be the optimal one when dealing with archaic experiences encoded in preverbal signs.

It would be extremely risky for a psychoanalyst to carry out experimentations outside the traditional analytic setting. Data generated by such experiments would not be admissible as psychoanalytic and would be treated with not-so-benign neglect. To enter the data base of psychoanalytic knowledge, the application of the traditional psychoanalytic method is essential. The traditional analytic setting not only is the "proving ground" of all theoretical propositions, it also defines the boundaries of what constitutes psychoanalytic knowledge, which is based on personal experiences derived from the analysts' own analyses and from analyzing others, conducted within the bounds of the one and only legitimate procedure.

Given the narrowly defined boundaries of the psychoanalytic data base, it is extremely hard for the scholars and researchers of related fields to be recognized as contributors to psychoanalytic knowledge. Presumably this will prevent the "gold" of psychoanalysis from being contaminated with other metals. More likely it prevents psychoanalysts from coming under the influence of forbidden knowledge.

This "us versus them" attitude undermines all aspects of interdisciplinary research. I had a personal experience in this regard (Moraitis, 1979). For many years, I have experimented with a modified version of the psychoanalytic method that I applied in my collaborations with biographers. The aim of this project has been to study the psychological forces that enter into the writing of a biography and assist the biographer in bringing his work to a successful conclusion. Every time I have presented my work to a psychoanalytic audience I have received praise, but my work is referred to as "psychotherapy." This implies that my data are not admissible to psychoanalysis. Only John Gedo, who was my consultant on the first such project I undertook, and a few other analysts, have been willing to credit my work as psychoanalytic.

What constitutes the gold of psychoanalysis, and what are the other metals that constitute the forbidden knowledge? I think the prevailing sense of what is fundamental in psychoanalysis has undergone significant changes during the last 25 years. The original definition pertains to Freud's "fundamental hypothesis" about the unconscious and the concept of psychic determinism. Accordingly, the gold of psychoanalysis pertains to the data generated by the uncovering of the unconscious process, which involves systematic introspection facilitated by the application of the psychoanalytic method. In contrast the "forbidden knowledge" pertains to the data of consciousness collected by those who are uninformed about the existence of the unconscious and attempt to explain what is psychical by observation from without rather than from within.

Freud devised the psychoanalytic method in an effort to facilitate introspection and open a window through which certain elements of the unconscious could
reach consciousness. Those elements pertain to what was repressed in the dynamic unconscious. According to Freud, only the repressed ideas in the dynamic unconscious are potentially knowable by the use of the psychoanalytic method. The rest of the large domain of the system unconscious remains unknowable. In his 1923 paper, he writes:

We recognize that the UCS does not coincide with the repressed. It is still true that all that is repressed is unconscious, but not all that is unconscious is repressed. . . .

When we find ourselves thus confronted by the necessity of postulating an unconscious that is not repressed we must admit that the characteristics of being unconscious begin to lose significance for us. It becomes a quality which can have many meanings, a quality which we are unable to make, as we would have hoped to do, the basis of far reaching and inevitable conclusions [p. 18].

The unconscious as a psychic "system," largely unknown, and the unconscious as a domain, presumably knowable, are two very different concepts that have widely different theoretical and clinical implications. Despite the original resistance Freud's ideas created, the concept of the unconscious as a psychic system, largely unknown, has captured the imagination of our culture and has been embraced by many creative thinkers in the humanities.

In contrast, Freud's proposition about the dynamic unconscious has become primarily the indispensable part of psychoanalytic clinical theory, because it provides the clinician with certain configurations by which clinical data are organized. By and large all psychoanalysts proceed with the notion that they have privileged information about the existence and contents of the unconscious which they have collected by the application of the psychoanalytic method. For the psychoanalyst, the unconscious represents the repository of all knowledge about human nature, and the psychoanalytic method the only means by which we can acquire scant knowledge about it. Such notions parallel Plato's story of the cave-men in The Republic (n.d.), according to which human beings, like prisoners, are chained to the wall of a dark cave where they cannot turn around to see the light, and mistake the shadows of objects as real. The task of the philosopher is to emerge from the cave and glimpse into the true source of being. When the philosopher, who has seen the light, returns to the cave to inform the prisoners of their misperceptions, he only succeeds in provoking their ridicule. Before they can be persuaded, they must experience the light themselves, a process that constitutes a formidable task.

The experience of the psychoanalyst can be compared with that of the philosopher as Plato described it. Psychoanalysts claim that they have seen glimpses of the light, but when they tell this to the cavemen they are ridiculed. Only by persuading them to follow their path, they can show the cavemen the light. Within the bounds of this metaphor, the light is the unconscious, and the shadows the
cavemen see are the data of consciousness. This deeply instilled belief and sentiment in the field of psychoanalysis makes all interdisciplinary studies problematic, because it places psychoanalysis under the cast of a belief or faith system, rather than that of a scientific enterprise. In the quest for understanding human nature and mastering the complexities of mental illness, psychoanalysis cannot justifiably make claims to a monopoly. Psychoanalytic nosology and treatment must take into consideration the knowledge gained from other related fields.

The psychoanalyst's sense of identification with the world of science that dominated the field of psychoanalysis up to the late sixties and early seventies was built on a very narrow basis. It is for this reason that, during that time, no meaningful bridges were built with other disciplines, despite the medicalization of psychoanalysis in the United States. Systematically, psychoanalysts placed themselves in opposition to biological research and to cognitive sciences, as a result of which they found themselves increasingly isolated as a profession. This was not, of course, true across the board, and it was through the work of the few well-informed thinkers that psychoanalysis shed the pseudoscientific notions associated with its metapsychology, making room for a new set of values and identifications. This was not without some serious complications. The "widening scope" of psychoanalysis brought enormous changes in psychoanalytic theory and in clinical practice, and deeply affected the self-image of psychoanalysts by the traumatic deidealization of Freud and some of his propositions that, for a long time, had been taken for granted. It was not only the metapsychology that was discarded, but also Freud's clinical theory that became the object of criticism and of efforts to redefine it.

It is outside the scope of this essay to review all the theoretical and clinical propositions associated with this historical period in contemporary psychoanalysis. In this essay, I focus on how the term knowledge has been disavowed in psychoanalysis, especially when defined as the product of direct observation, experimentation, and rational thinking, and the pervasive need to declare ignorance that has dominated the field as a result of it.

It took a long time for analysts to realize that women's wish for the penis, masculine protest, and men's strivings against passive-feminine urges do not constitute the bedrock of all psychological strata, as Freud (1937) declared. Slowly but inevitably it became evident that certain developmental issues play a decisive role in most analyses, and that the analyst's capacity to address them determines the success of the whole enterprise. In the beginning the "pregenital" issues were considered obstacles analysts had to overcome to engage their patients psychoanalytically, but gradually it became evident to most analysts that oedipal issues are only one aspect of the patients' pathology, and that analytic treatment must address issues in the patients' pathology that are a good deal more archaic in origin.

The different schools of psychoanalytic thought offered a wide range of speculative and largely untestable propositions about the nature of these archaic is-
issues and the approach to their cure. Melanie Klein (1926) identified oedipal issues in the first year of life, but most others focused on the mother–child dyad in an effort to trace back the origins of the pathology. However, the patient’s associations in the clinical situation provide insufficient data upon which reliable assumptions can be made about what happened and why during the preverbal and presymbolic steps in development. To compensate for that, many analysts began to direct increasingly more attention to their own subjectivity as an instrument in understanding the communications of their patients.

Gedo (1986) alerted psychoanalysts to the risks involved in assuming the presence of unconscious meanings when, more likely, none are there, and in using the analyst’s subjectivity as the basic reference point for understanding the patient’s communications. His message has had a hard time in coming through to those psychoanalysts who have been swept away by a strong wave of modern-day romanticism about intersubjectivity and the associated cynicism about the data of consciousness and all efforts to establish reliable facts. Under the circumstances, those who claim ignorance, cognitively speaking, are presumed to be the knowledgeable ones, whereas those who assert their knowledge and expertise are considered naïve and ignorant.

There is, of course, a long philosophical tradition going back to Plato and Socrates which emphasizes the importance of recognizing man’s ignorance. The postmodern cultural trend, however, the steps of which many contemporary psychoanalysts are following, has very little in common with classical Greek philosophy, which viewed the world as an ordered expression of primordial forces and ideas.

The romanticism to which I have referred is evident in the psychoanalytic propositions of object relations theories, of self psychology, of the hermeneuticists, of the constructionists, and of Lacan’s theories, as well. All these theories implicitly or explicitly emphasize a loosely defined communication between the unconscious processes of the analyst and those of the analysand that goes well beyond what can be documented by the data of consciousness. The unconscious in object relations theories resembles a secret theater stage on which the individual interminably reproduces a more or less obsolete play that was originally written in childhood. Sandler and Rosenblatt (1962) were the first to introduce this metaphor. The characters on the stage represent the child’s various internalized objects, and the play is a replica of early transactions with the caretakers. In this schema the analyst is gradually seduced by the patient to become part of the unconscious drama through a mechanism first described by Melanie Klein as projective identification.

The psychoanalytic reader is well aware of the extensive nature of the psychoanalytic literature on projective identification, the complexities of which I do not address in this discussion, except to remind the reader that the role of the analyst in projective identification is conceptualized as that of a recipient of the patient’s demands to reenact an unconscious drama, as a result of which the
analyst's unconscious is mobilized in compliance with or in defiance of the patient's demands. According to these theories, it is the analyst's self-analytic inquiry that will provide the crucial clues with which to decode the patient's unconscious communications.

Kohut's propositions about the role of empathy in psychoanalytic treatment are in some respect consistent with the concept of projective identification. By defining empathy as "vicarious introspection," Kohut (1959) also conceptualized the analytic situation as a dyad in which the analyst places his or her subjectivity, and the unconscious processes associated with it, in the service of the patient's needs and demands.

How reliable is the analyst's subjectivity in the understanding and uncovering of the patient's unconscious aims? How is it possible for the analyst to accurately differentiate between subjective responses that were produced by the patient's communications and those that are not necessarily related to them? Furthermore, can the analyst forfeit, at will, some of his or her own selfish considerations, in order to place his or her internal world into the service of the patient's treatment? Only a generous dose of poetic license could have made such propositions so persuasive to so many good analysts.

There is a different kind of romanticism in the propositions of those who advocate that psychoanalysis is a hermeneutic enterprise and that the use of the term unconscious be limited to its descriptive meaning (Spence, 1982). In such theories the importance of the narrative is romanticized, and facts are debunked as unattainable. Furthermore, meanings extracted from the "here and now" (Gill, 1982) of the analytic situation replace the search into the depths of the patient's unconscious.

Many psychoanalytic writers of the post-Freudian era have used catching terms to appeal to their readers' romantic disposition. Winnicott's (1960) concepts of the "true self" and of the "holding environment," Bollas's (1987) concept of the "unthought known," and Kohut's notions about the self and about "empathic immersion" into the patient's subjectivity, are examples of that. To be sure, Freud's fundamental hypothesis about the unconscious is highly romantic too, and this accounts, partly at least, for its appeal, but Freud worked hard to help his readers move beyond their romantic temperament and to engage them in a scientific examination of the mind that was empirically and epistemologically sound.

Romanticism and its counterpart, the scientific revolution of the Enlightenment, represent two distinct cultural trends, two temperaments that have their roots in the Renaissance, with which they have a lot in common. They both rebelled against oppressive forces, against religious dogma and superstition, and are "humanistic" in nature, in the sense that they are attentive to human needs and indispensable in the study of human nature. They have, however, some very deep differences in the ways by which they approach their task. In describing these differences, Richard Tarnas (1991) writes:
The Enlightenment's scientific examination of the mind was empirical and epistemological, gradually becoming focused on sense perception, cognitive development, and quantitative behavioral studies. By contrast, beginning with Rousseau's *Confessions*—the modern romantic sequel and response to the Catholic confessions of Augustine—the Romantics' interest in human consciousness was fueled by a newly intense sense of self-awareness and the focus on the complex nature of the human self, and was comparatively unconstrained by the limits of the scientific perspective. Emotions and imagination, rather than reason and perception, were of prime importance [p. 368].

The geniuses to be celebrated by the Enlightenment temperament have been Newton, Einstein, and the pioneers in medical sciences and, more recently, of space exploration. On the Romantic side, Goethe, Schiller, Rousseau, Keats, Byron, Pushkin, and Thoreau are some of the leaders that emerged during the eighteenth and nineteenth centuries. The one group is admired for their rational intellect and their power to explore the laws of nature; the other, for their creative imagination, emotional depths, and capacity for self-expression and self-creation. Freud came to symbolize the bridge between these two temperaments, and maintaining that bridge constitutes, for most analysts, the "Fusion of Science and Humanism" upon which the whole psychoanalytic enterprise rests.

What is described as a fusion or as a bridge is, in its essence, a balancing act, which during the Freud years was maintained primarily because of Freud's capability to operate in both of these two modes of creativity. Freud was both a scientist and a romantic, a true Renaissance man who could combine the two temperaments despite their contradictions.

Following his death, a concerted effort was made, in the United States, to cultivate Freud's scientific temperament through the propositions of ego psychology and the affiliation with the medical profession. Gradually, however, the concept of the "ego" was romanticized and made synonymous with that of the "person," as a result of which it lost its scientific value as an explanatory proposition. Simultaneously, Freud's metapsychological propositions lost their credibility and, along with them, the capacity of psychoanalysts to claim a place in the world of science. The balancing act Freud so carefully maintained could no longer be sustained, and there was a call from many directions to abandon the claim for a scientific status of psychoanalysis. In their eagerness to avoid being identified as pseudoscientists, many psychoanalysts embraced Romantic theories without realizing the danger of becoming pseudopoets as opposed to pseudoscientists.

It is important to take into account that the Romantic movement of the twentieth century has undergone substantial changes from its counterpart in the eighteenth and nineteenth centuries. In a way, in *Thus Spoke Zarathustra*, Nietzsche (1883) personifies this change with his claim that God is dead, that truth must be created rather than found, and man has to invent himself anew and will his
existence on the chaos of a meaningless universe without God. In this postmodern era of Western culture, the Romantic love for beauty, nature, and eternal truth has been replaced by the individual’s sense of entitlement and the cynical denouncement of those who aim to discover an orderly universe with its laws and structure.

Never before in the history of science have discoveries been made at a more rapid pace, both in the understanding of human nature and in the world that surrounds it, but it seems that Western culture is deeply conflicted about it. Man-kind is in a state of awe in view of the progress made, whereas, on the other hand, every effort is made to debunk these discoveries and render them meaningless.

Not all psychoanalysts gave up their commitment to the Weltanschauung of science. Throughout this period, Gedo maintained his conviction about the biological basis of psychoanalysis, and anticipated developments in the interdisciplinary field long before they became established facts. His contributions aimed to restore the balance between science and humanism in psychoanalysis, by reinforcing the capacity of psychoanalysts to think as scientists and deal with the input from allied fields.

The hierarchical model of the mind, first introduced by Gedo and Goldberg (1973) and further refined by Gedo (1991), is a scientific organizational schema designed to guide the psychoanalysts who feel lost in the labyrinth of competing explanatory propositions and therapeutic approaches. Within the bounds of this explanatory map, no theoretical or clinical psychoanalytic model assumes a monopoly. Instead a conceptual ground is offered, within the bounds of which the psychoanalytic clinician can use different theories to deal with different sets of empirical data. Furthermore, the map is offered not as the final map, but as a conceptual reference that can accommodate “an infinite set of potential variables.” Inevitably the hierarchical model reduces all major psychoanalytic theories into components of a larger conceptual schema and defines different therapeutic modalities for different types of pathology. Gedo challenged the hegemony of interpretation as a therapeutic tool, and introduced pacification, unification, and optimal disillusionment as psychoanalytic modalities equal to interpretation. In doing so he went a long way in making the analytic instrument more scientific in its applications.

The proliferation of studies in human development provided new venues for the investigation of early developmental events. These studies constitute the “objective” approach, because it is the investigators’ observational capacities that are being utilized rather than their subjectivity. On the basis of these observations, a series of hypotheses about the nature of the infant’s subjective experiences and cognitive development have been advanced. Inevitably, all these observations are made from “without.” There is no way for infants to provide us with a view from within.
Accordingly, the studies in child development have facilitated to a degree the analyst’s awareness that subjectivity as a perceptual and therapeutic instrument does not suffice in mastering all the complexities involved. Psychoanalysts’ investigations must also rely on the sensory impact and rationality, not only of their own, but also of those who have provided the relevant research data.

The resistance among psychoanalysts to the input of data generated by genetics and neuroscience is by far stronger than that to data provided from other sources. The fact that many of Freud’s hunches and propositions resonate with recent findings of neurobiology hardly reassures the great majority of psychoanalysts, who seem to view the new discoveries more as a threat than as a promise. I have no statistics to support this statement, but in reviewing the contents of publications, the programs of conferences, and several private professional exchanges, I have the distinct sense that the claims of neurobiologists have made psychoanalysts feel invaded and outflanked rather than helped and supported.

There are, however, indications that changes are under way. This is evident in the increasing number of articles published in psychoanalytic journals on the applications of neurobiological data to psychoanalysis and the emerging interest in psychoanalytic research. Psychoanalysts cannot easily dispute data about which there is more or less a consensus among neurobiologists. One of the major difficulties in integrating such data into the psychoanalytic data base concern that the autonomy of psychoanalysis as a profession will be compromised.

Certain statements made by senior researchers, such as those of Gilbert, which I quote in the beginning of this essay, and of Francis Crick in “The Astonishing Hypothesis: The Scientific Search for the Soul” (see Solms, 1997), seem to support the notion that, in the minds of these distinguished researchers, introspective data are no longer needed. Some others, like Wilma Bucci, take psychoanalysis very seriously. In her recent publication (1997), she introduces her multiple code theory as the new psychoanalytic metapsychology. Regrettably she omits any references to psychoanalytic pioneers such as John Gedo, who have contributed so much toward this goal. Furthermore, she presents an empirical study of the analytic process without soliciting the reflections and commentaries of the analysts who collaborated with her in collecting such data.

I believe that psychoanalysts have some good reasons to be concerned that cognitive psychologists and neuroscientists are inclined to overlook or bypass the importance of introspection in their research activities and data collection. This, however, should not deter psychoanalysts from searching for ways to collaborate with neuroscientists and make every effort to develop mutual trust and respect.

A more serious obstacle in pursuing such aims pertains to the fact that, by and large, psychoanalysts have neither developed nor embraced the scientific temperament, which takes the empirical world on its own terms as fully real, and which makes rationality and logic the foundation of knowledge. Freud
systematically attempted to provide a scientific basis for psychoanalysis, but, for most psychoanalysts, the world of science is more of a Romantic concept than the everyday reality of their professional life. The Romantic element in psychoanalysis, which was already strong while Freud was alive, became dominant following his death.

By emphasizing the Romantic element in contemporary psychoanalysis, I do not imply that psychoanalysts are poets at heart. By and large, psychoanalysts are neither research scientists nor scholars in the humanities. Their basic considerations are practical ones and pertain to their concerns about being able to effectively respond to their patients' communications and maintain their self-esteem, reputation, and income as professionals. Although they may be deeply affected by the Romantic nature of contemporary psychoanalytic theories, it is primarily the directives and the instructions that they value, because it is only through them that they can place themselves a few steps ahead of their patients in the clinical situation. Thus they may wear the hat of the scientist or the hat of the poet, depending on what seems to work better for them in their clinical practice.

The more gifted individuals within the psychoanalytic community operate well beyond such boundaries and struggle to develop new psychoanalytic concepts by testing the boundaries of psychoanalysis with allied fields of endeavor. How successful they become as the leaders within the psychoanalytic community largely depends on their capacity to translate their ideas and findings into relatively easy to comprehend theoretical propositions and clinical instructions. Freud was very successful in being able to operate at several levels of sophistication while promoting his theories and recommendations. Klein provided clinicians with very direct and uncompromising instructions. To an extent, Winnicott (1951), Kohut (1971), and Kernberg (1975) have tried to do the same, but gradually the widening scope of psychoanalysis made it very difficult to simplify theories and the clinical directives that derive from them.

In the beginning of psychoanalysis, the therapeutic aim was a relatively simple one: to uncover the pathological fantasies and the repressed ideas associated with them. Psychoanalytic theory provided the clinician with clear expectations about the nature of these fantasies and where to find them. Ego psychology made the clinician's task considerably more complicated, but many of the complexities were bypassed by a careful screening designed to eliminate the "unanalyzable patient."

Within the bounds of the "widening scope," the aim of psychoanalytic treatment has become much broader. It has taken the form of a reeducational process without clear boundaries, which clinicians experience as a long and arduous effort to reparent their patients. Given the complexities involved, no clear directives or formulations are possible. Instead, psychoanalysts are offered a variety of choices provided by several competing schools of psychoanalytic thought.
within an eclectically organized professional climate. Inevitably such eclecti-
cism has raised the level of anxiety of most analysts, and has generated a perva-
sive sense that psychoanalysis as "science" is "an emperor without clothes" who
has abandoned his subjects to the darkness of ignorance. This has been further
facilitated by the dramatic drop of the number of people who seek psychoana-
lytic treatment and the cultural climate of our times.

I believe that there is an urgent need in psychoanalysis for an ordered, com-
prehensive, and easy-to-grasp conceptual schema, based on certain testable propo-
sitions. Furthermore, such a schema should be able to provide some clear cli-
nical principles and directives, the efficacy of which should be under continuous
scrutiny. Can the data from neurobiological research help psychoanalysts to de-
develop such a schema and to monitor its effectiveness? Gedo's work has provided
many indications that this may very well be possible. However, all major propo-
sitions in psychoanalysis, if they are to take hold and become the way to define
and practice the profession, must appeal to the rank and file of the psychoana-
lytic profession. To achieve that they must be presented simultaneously at dif-
f erent levels of sophistication and be encoded in clear principles and directives,
along with the rationale for using them.

So far all efforts made to introduce neurobiological research in psychoanaly-
sis have followed two paths. In one of these, the findings of neurobiologists are
presented in the simplest possible terms, whereas, in the other, parallels and
connections are drawn between these research findings and Freud's original
propositions in an effort to illustrate the correspondence between the two. It is
very unlikely that such approaches will be of great appeal to the rank and file
among psychoanalysts.

By and large psychoanalysts are illiterate in neurophysiology and neuro-
anatomy. Those psychoanalysts who are physicians hardly remember their ref-
rences in these areas, and there is an increasing number of psychoanalysts who
have never had such an education. Only those few individuals who are seriously
prepared to reeducate themselves can do justice to the data presented. The corre-
spondence between Freud's propositions and neurobiological findings is likely
to generate some nostalgia and comfort among older analysts who may feel that,
at long last, they are vindicated; but the majority of younger analysts have little
regard or interest in Freud's original propositions. It is very unlikely that a sec-
ond Freudian revolution will be instigated in our culture by these means. I think
psychoanalysts should guard against such romanticism.

My limited knowledge of contemporary neurobiology does not provide me
with the ability to express a professional opinion about the extent to which the
knowledge gained can advance psychoanalytic theory and clinical practice. What
has been demonstrated to my satisfaction is that certain psychoanalytic propo-
sitions may be confirmed, refuted, or expanded on the basis of the new knowledge
gained. For example, transference in psychoanalysis has been viewed primarily
as a defense against new learning and change. In a recent publication, Fred Levin (1997) persuasively argues that transference also opens "windows" to learning and adaptation. I go a step further than that. It seems to me that, given our new understanding of the cognitive process, transference constitutes the perceptual instrument through which all perceptual input is processed. Furthermore, the awareness of the transference is the means by which man can distinguish the objects from their shadows.

When viewed under this light, psychoanalysis cannot claim a monopoly in the study of the transference. There are many procedures by which transference phenomena can be studied, and, to broaden the data base of psychoanalysis, it is important to adopt a procedural flexibility that will facilitate greater experimentation and collaboration with other fields. This not only will enable psychoanalysts to become familiar with what other research scientists know but, even more importantly, how they got to know it. If psychoanalysis is to remain an autonomous scientific and intellectual discipline, it is not sufficient to import knowledge from other fields, it must also acquire a method by which to integrate such data and bring them into some form of alignment with the data base of psychoanalysis.

References


Freud (1896, p. 204), once wrote a passage illustrating, without realizing it until years later, that his own strongly held theory about seduction was seriously distorting his interpretation of the clinical psychoanalytic data (Sadow et. al., 1968). Even Ernest Jones wrote on this occasion that Freud's efforts showed "less psychological insight than we are accustomed to . . . [from him]" (1953, p. 264). Yet if Freud, at the height of his creative powers, could err in this manner, imagine how much easier for most of us to succumb to errors of observation based on the intrusion of theory. As the great French neuropsychiatrist and teacher of Freud, Jean Martin Charcot, cautioned, theory is fine, but it doesn't keep facts from existing!

This vignette provides an effective starting point for examining the vicissitudes of theory: what theory is about, what the word might mean and its history, and what makes theorizing and observing activities in analysis so treacherous for the unwary. My concept of "theory" makes use of an evolutionary, developmental perspective. I also attempt to link these thoughts about theory to the work of John Gedo, especially his use of theory in his epigenetic model.

The *American Heritage Dictionary* definition of theory is "a general principle, formula, or ideal construction offered to explain phenomena and rendered more or less plausible by evidence in the facts or by the exactness and relevancy of the reasoning." A second definition in the same source is "a hypothesis offered on the basis of thought on a given subject; loosely, any idea, guess, etc. put forward to be accepted or rejected in seeking the explanation of some condition or occurrence." Implicitly and explicitly, both these definitions suggest a close connection between theory and evidence. Yet it is at this interface that many of the problems specific to our field occur, as I attempt to describe.

As a general rule, analytic theories seem to linger on long after contravening evidence has been discovered and become well known. In this regard, Freud was not systematic about retracting his own erroneous theories, but rather did so
quietly (see Grinker's introduction to Gedo and Goldberg's *Models of the Mind*). Thus psychoanalysis has a tendency to add new theories much like some add new artwork to their living room, without regard to consistency or appropriateness. In other words, as specialists we seem to do better at uncovering the "relevancy of reasoning" or at describing syndromes than at working our analytic data to actually test and possibly disprove our underlying hypotheses. Few of our writers are skilled at using evidence in any way other than to illustrate theory, and our highly selected observations often overlook those aspects that do not fit the anointed theory.

Why is theorizing in psychoanalysis so much more difficult than in other fields? A number of reasons immediately suggest themselves. First, our data of observation are "soft" and imprecise; a consensus is often difficult to establish. We are not even entirely clear about what constitutes data. For example, a patient is a few minutes late and comments merely that this is because the bridge was up. Is the lateness the data? Or is only the meaning attributed to the lateness, that is, the patient's spontaneous denial of the meaningfulness of this event, the significant data? If we say that only the uninterpreted act (which occurs outside the matrix of meaning) is proper datum, we are overwhelmed with a large number of acts that might be interpreted.

Perhaps we should be forgiven, however, if our way of understanding is not congruent with "proper" scientific method. If we exercise our interpretive propensities, we are, after all, introducing a factor extrinsic to the item observed, namely, more than a bit of ourselves. This bit of ourselves necessarily includes a set of nascent theories or hypotheses about such things as lateness (at the clinical level); it also, of course, includes some intimate knowledge of our own feelings and behavior vis-à-vis particular situations and patients.

Thus, we may ultimately interpret that the patient is late because of some fear of closeness to us, or as something that emanates from some concern of the patient, which may not be so obvious, such as a less than conscious feeling of irritation or anger toward us. In doing so we might justify our interpretation to ourselves by means of a belief that we have discovered evidence of some awkwardness in closeness, or some vengefulness in the patient in the past, or what we read as anger on his or her part. Or perhaps we see the patient's lateness as part of a subtle attempt at seduction associated with both a wish and a fear, apropos of the earlier reference to Freud's work at the time of his concern about seduction. We might still not be so sure, however, that, like Freud in 1896, we could be abusing the patient's innocent act by the intrusion of a theory at a point where continuing observations might be more appropriate.

The problem as a practical matter is that we cannot really know if we are right or wrong when we interpret anything. In a nutshell, we cannot even make a useful observation in any clinical psychological arena that does not take into account our self as observer as a most significant contributor to the field being
observed. Analytic data are really, much more than in the other sciences, an amalgam of material provided both by the patient and the analyst. Note here that I am not making reference to psychopathology on the part of the analyst (although this can also occur easily enough). Clearly, even nonpathological countertransference distortions significantly complicate what we observe and how we respond. I have no doubt that such distortions occur in the "hard" sciences as well, but less frequently. However, in our field, even when the observations are reasonably free of actual countertransference distortions, the observer remains, as always, part of the data.

For example, in "The Two Analyses of Mr. Z," Kohut (1979) became aware by the time of the second analysis (or better, the second interpretation of his own life, because it is now well known that Kohut was himself Mr. Z) of a whole range of psychological phenomena of which he had not previously been aware. Thus his "second analysis" appeared to address almost a different individual entirely. Yet we cannot assume that the new bits of data were not present during his earlier treatment. Personality and history are too consistent for that to be true. A better hypothesis would be that, as a consequence of his continuing work with others as well as with himself in his continuing self-analysis, Kohut became aware of data that were present all along but which he had previously been unable to observe or assimilate. It seems that this difficulty in learning was the result of the absence of a theory with the power, to speak, to take decisive bits of data into account. And the absence of such a theory was in turn due to Kohut's not yet having completed enough self-analytic work to enlarge his perspective and permit him to enlarge psychoanalytic theory more generally. The fact that both analyses were of himself would appear to support my conclusion that it is both theory and personal development that permit new perspectives.

So much for difficulties with data. A second major dilemma for theorizing pertains to the shifting way we define words. In a field without mathematical precision, definitions of important terms tend to take on meanings that vary with the specific epoch of theory formation, with the school of the contributor, or with the purpose for which the word is intended. Take the word ego, for example. It initially referred to something synonymous with consciousness. Freud later focused on ego as a mediator between inner forces and the environment. Not many years later, however, it became clear to some of his followers, most notably Heinz Hartmann, that Freud had been using ego in two rather distinctly different senses: (1) as something close to today's concept of self, and (2) as a more general agency of mind. Gradually ego came to mean more fully an agency of mind coordinated with id and superego—this was the ego of the structural hypothesis. No sooner had this become fairly well established than the definition shifted again, this time taking on meaning in terms of its contents, that is, the term expanded to include a whole gamut of functions, including psychological defenses, motor functions, and memory. Moreover, at the same time ego...
moved from a static concept within the confines of the therapeutic hypothesis ("where id was, there shall ego be") to a concept with important genetic roots. In other words, ego took on an increase in level and range of consciousness.

Thus the changes in the concept of ego invited further concerns in psychoanalytic "culture" about the relationship between genetic loading for various capacities and environmentally determined inputs, such as the adequacy of parenting, which can play a releasing role in development. Moreover, if such words as ego can become yoked to questions about nature and nurture, how many other complex variables—known or unknown—can alter its definition further? If this is disadvantageous for a science, however, there may also be an advantage in allowing a certain degree of looseness of definition of terminology as fields are undergoing rapid advancement.

Still another problem in developing theory in our field is the general dependence of psychological theory on cultural and technological factors that serve as metaphors which guide our thinking. Freud's energy theory did not arise merely out of the data of psychoanalysis. From its outset, drive theory emanated from Freud's knowledge of the theories of nineteenth-century science, including physics and biology. But as the physics and biology in particular evolved, any psychoanalytic theories depending on these domains required adjustment if they were not to become obsolete. On this basis, drive theory (e.g., the concept of energy cathexis) lost its support and was eventually supplanted by the notion of information distribution. My purpose here, however, is not so much to describe the specifics, which are already well known, but to distill out what I see to be the core difficulty for theory change: that mere metaphors which can originally assist novel thinking fail if they do not contain some significant measure of truth, or if they are not themselves inviting change. Put differently, when we do not really understand something, what is appealing about theory is the creation of the illusion of understanding. But unless a theory is being created in relation to reliable observations, then theory cannot but rapidly degrade into a rigid system of belief.

Such has been the case with some psychoanalytic theorizing, which has failed to attempt any integration of contemporary psychology and biology. As Gedo has pointed out, for a theory derived from an extraneous field to be useful, the data derived from such a field must be congruent with psychoanalytic data. That is, if the data which emerge from studying the brain and the data of psychoanalysis inform each other, then the borrowed neuroscientific theory is more than a metaphor, and offers something of genuine value. Although the serious study of the interplay between psychoanalysis and biology is only a couple of decades in the making, the data from these two fields have already become sufficiently congruent that theoretical advances reflecting this congruence are becoming increasingly evident (Gedo, 1988, 1993, 1995, 1996; Levin, 1980, 1991, 1995a, 1995b, 1995c).
Today we continue to lean heavily on the intellectual surround for our theories. As our culture has gradually shifted emphasis from gross mechanistic concepts to those of organization, self, individualism, and process, so too has there been a shift to the same subjects within psychoanalysis. Thus we think about emotional and textual interaction between patient and analyst, and as one might expect, such theories are much more individualistic. We also tend toward larger numbers of seemingly unrelated theories, each with a special, narrowly focused language and a small group of adherents who tend not to communicate much with the adherents of other theories.

The somewhat less successful attempts to introduce systems and information theory, neuroscience, and hermeneutics into the psychoanalytic corpus are examples of conceptual borrowings which have added a richness to our language and to clinical understanding. As with the original borrowing of the energy concept from physics, however, these contributions are not intrinsic to the analytic data base and therefore less able to establish falsifiable hypotheses in the ordinary scientific manner, although they can be suggestive of significant tests of validity and of patterns that require analytic inquiry.

These comments on the limitations of borrowing should not be taken as anything but constructive criticism because it is impossible to imagine psychoanalysis progressing without nurturance from sister sciences, just as, in fact, psychoanalysis itself nurtures these other fields considerably. It does mean, however, that cautions need to be observed: what is borrowed cannot be treated identically with a theory derived from evidence based on analytic clinical experience. It would be more correct, therefore, to define borrowings exactly the way Freud did, as metapsychological: contributions that derive from beyond the core clinical base of our field. From Freud’s perspective, such metapsychology is an important intellectual scaffolding which we must nevertheless be ready to discard or update without hesitation.

One further point on the evolution of theory, and a related danger. There is reason to believe that there are two different modes of psychoanalytic thinking (Sadow, 1984), one generative and the other patterning. When operating in the generative mode, analysts make use of introspective, empathic, and intuitive qualities of thought. In this mode the analyst is most closely tuned to the fine nuances of affect and cognition in both patient and self. In the second or patterning mode, qualities of logic and rationality are the primary organizers. We learn to use the generative mode when we are with our patients, and the patterning mode when we are reflecting on the experience afterward. Obviously scientific endeavors would need both modes. But what I wish to highlight here is the danger associated with the undue intrusion into the observational field of the patterning mode.

Because theories are organizers of perception, and the need to organize is ubiquitous, analysts are perpetually at risk of interpreting too much or too quickly,
by which I mean, interpreting for the purpose of finding patterns that reduce their own discomfort or what they perceive to be the patient’s discomfort. Put differently, explanatory comments to patients, even not entirely correct explanations, appear, at least temporarily, to help control the disorganization associated with novelty or frightening feelings (Moraitis, 1986). The pell-mell rush to interpret the patient’s motives, feelings, actions, and so on may thus serve a defensive purpose rather than the goal of enlightenment. The by-products are complex: They include the creation of the mere illusion of insight. They also can perturb patients by confusing them about motives which they are otherwise in the process of finally understanding more accurately.

Before the scientific era, learned individuals made pronouncements that were akin to contemporary theories. As noted earlier, not to understand is, at a minimum, disconcerting; for this reason historically myths and religious beliefs had been created. A flood was no longer as bewildering if it was understood to be a response by the gods to some perceived transgression by mortals. Religious beliefs, of course, also provided a sense of community, just as scientific societies provide in the present day.

From an evolutionary perspective, the anxiety associated with primitive beliefs further provided a means of alerting society to danger. In effect the dangerous and confusing world was assuaged by one in which a magical order reigned supreme, and men became more powerful through their appeals to the supernatural.

Today, in our scientific mode, we are unlikely to appeal directly to the supernatural for understanding how things work. Yet the powerful psychological forces that originated in ancient myths and beliefs in supernatural forces still are available to influence such things as religious-like faith in contemporary science. And even today we see firmly held scientific beliefs of a most incredible nature utilized to explain and make order out of what to some must appear as a chaotic and frightening world. By the mastery of the situation in thought, and eventually in theory, we achieve a sense of comfort and order.

In suggesting this psychological basis for theory making, I am of course implying something about “correctness,” at least in the utility of particular theories in providing useful and testable explanations for particular phenomena. I am not, however, taking a position about what is ultimately “correct,” but more arguing, as did Immanuel Kant about what is intended to be verifiable in a scientific sense versus what is not meant to be verifiable but rather a matter of belief (see Levin, 1995c).

It should be clear from the foregoing discussion that the first and foremost purpose of scientific theory construction is to organize seemingly discrete bits of observational data into larger units based on meaningful, reproducible relationships among them. The critical word is meaningful. As in the earlier example of the patient who was late, there is a problem in explaining this lateness.
properly. If the patient is both late and angry, there may be a causal connection between the lateness and the anger. But any interpretation to the patient that he or she is late because the patient is angry remains to be demonstrated, because there are other explanations which cannot be immediately ruled out. One, for example, is that the anger is the consequence of the lateness. Without going into the very complex details required to properly understand the lateness, let it suffice to note that in my opinion, we need to be exceedingly careful with our interpretations in such cases, because of the dangers of overly influencing the patient into accepting our viewpoint(s) at the expense of his or her own.

Thus, if our favorite theory concerns transference, the connection between lateness and anger (in the example) would be seen as transferential; or if our favorite theory would be something other than depth psychological, then an unexpectedly open bridge may be seen as the primary explanation of the lateness. Either way, however, we may feel compelled to get to an explanation, a theory that explains, or in our parlance, interprets the behavior of the patient, or we could withhold judgment and wait for that extra bit of information that would allow us to nail down the explanation. Although the cost of waiting to understand anything is some level of tension, waiting seems worth it to me. In other words a major abuse of the use of theory in our field is rushing in to make clinical interpretations and foreclosing the admission of new contravening or clarifying evidence.

Once established, a theory becomes a powerful tool of perception. This is hardly an original observation, but its importance in clinical work cannot be overstated. Again, correctness or incorrectness in a given instance is less of an issue than the simple availability of the theory. A theory becomes established because it has some degree of correctness, but other tests must be employed to establish correctness. Just as with the data I discussed earlier, theory is something the clinical observer brings to the scene. We might say that, for some, a theory becomes simply a device of a quasi-personal sort that screens out extraneous, nonconforming stimuli and permits a focus on stimuli that fall into some preset pattern. And the pull to make sense out of disorganization sometimes forces a false order onto data, or a misperception of stimuli, designed to reduce to insignificance those stimuli that might not conform to the theory.

But that is not precisely what I mean by the phenomenon of theory as a tool of perception. The Freudian will be sensitive to certain aspects of the situation; that is, he will perceive only some of the data; and the self psychologist may be sensitive to a different enough array or conglomeration of the data, so that the two may appear, to a "neutral" or outside observer, to be perceiving quite different phenomena. That is quite aside from differing interpretations about a given bit of data when competing theories each take proper account of the same bit of data. It would then be hard to say what is more significant: the somewhat different set of data perceptually permitted by our two different psychological theories
About Theory

or the differing interpretations of a specific set of data by two different theories. My belief is that actually both views are important. An elaboration, however, is beyond the scope of the present discussion.

Let me turn again to the question, what purpose does theory serve? As I have noted elsewhere (Sadow et al., 1968), at its best, the analytic process constitutes a creative endeavor evolving new structure, where previously there were developmental gaps, arrests, or pathological conflicts. It may be that new structure in this case means the literal establishment of new neuronal connections (Levin, 1991). In other words, the analytic process sets in motion a creative surge that operates beyond the transfersences to work out some portion of the patient’s life, where there had been relative emptiness. We do not know a great deal about this process, except that we have been witness to it in a number of patients. Moraitis (1986) has referred to this process in a larger context (beyond the therapeutic) as the pursuit of novelty. He believes that it can best be categorized as a form of learning by the active pursuit of enriching experiences, an idea with which I agree.

Those individuals who are capable of assimilating and synthesizing quantities of new experience either to fill some gap in themselves or for some other, unknown reason, may become the creators of new theory. We have evidence from an investigation of Freud’s theorizing that it was through his intense pursuit of his own unconscious mentation, his self-analysis, that he arrived at some of his clinical theories (Sadow et al., 1968). Theorizing then, at least some of the time (perhaps most of the time), is driven by the need to fill some gap in one’s self. In our field, if that gap has any universality, and if the theory that results does indeed have some explanatory value for a significant part of the population with which we come into contact, it is useful and becomes part of the tool bag of the community. If theory is merely idiosyncratic, however, it remains a curious idea of little consequence to others.

To sum up, I have suggested three psychological purposes that theorizing may serve. First, it may reduce the discomfort of chaos and uncertainty by providing a sense of order or meaningfulness. Second, theory functions as a perceptual tool. On the positive side, this facilitates understanding by allowing us to take in more of the data potentially available. On the downside, however, it eliminates data that do not conform to the theory’s constraints. So, theory inevitably enhances the preset pattern at the cost of some increment of progress. And third, theory provides a means to deal with conflict or deficit in the theoretician, to the potential advantage of others who are similarly affected.

A life enhanced by a creative synthesis results in a feeling within that person of harmony, an inner beauty, a sense of healthy grandeur. So, too, with theory generally. If it truly meets a widely experienced but previously unarticulated need, it has beauty, harmony, and style. In this sense, theory in our field is no different from theory in other fields. Natural scientists also speak of certain theories as having eloquence, grandeur, and an esthetic quality.
I have also noted how we abuse theory. The vignette I quoted at the outset offers a striking example of such abuse. Freud had labored mightily to establish his early seduction hypothesis. A fairly elaborate set of etiologies for specific pathological sequelae suffered by the adult patient who had been seduced in childhood had been worked out. Freud did not yet know that most patients who had described childhood seductions were in fact merely describing their fantasies. Through his own self-analysis, he discovered that people responded to fantasies of nonreal events or to the memories of those fantasies as if they were real, and therein lay one cornerstone of psychoanalytic thought. But, in 1896, when he wrote on seduction, Freud knew only that patients responded profoundly to important childhood experiences. In this instance involving Freud, the abuse of theory was not merely in the error, which was, in fact, a most understandable one, considering the psychosocial ambience of turn of the century Vienna. The abuse was in Freud’s overriding the data at hand: in his rejecting evidence provided by particular patients and rather arrogantly insisting on the correctness of his theory. Theory was used in this instance as if it were actual data which took precedence over the data generated in the session, and not as a more or less tentative proposition always subject to correction or rejection.

The substitution of theory for data is so common an abuse—probably universal—that it might be instructive to think about what makes it come about. The information we call data is usually conceived of, incorrectly, as if it were entirely derived from external sources. Theory is the imposition of a previously established pattern of meaning on data. But the data, as we have seen, are themselves products of the theory, an amalgam of sorts between what is really out there and how those truly external registrations are worked over in the mind of the observer by many personal factors. These factors include experience, taste, memory, personality, conflict (psychopathology), and, perhaps most significantly, the previously established theory itself. Thus the data, once they have become data, stand rather close to the theory as a figure not highly distinguished from background. Even if nothing else motivated one to conflate theory with data and substitute the theory for the data, the intellectual effort involved in keeping them separate is considerable: it requires nothing less than continuous self-scrutiny.

There are other reasons for confusing theory with data. It is reasonable to assume that, for Freud, the understanding and clarity gained by organizing the data, or the apparent data, according to his theory must have been quite gratifying. He was able to move beyond the level of Kraepelinian classification to the beginnings of a theory of the etiology of mental illness. We can imagine the gratification he must have experienced at this conquest of uncertainty and confusion. The fact that he was at times in error was insignificant as compared with his achievement at arriving at an explanation for complex psychological phenomena that made sense. To have allowed his patient to implicitly reject his theory would have been too painful in that he would have been forced back to the prior level of etiologic confusion. This may be another way of saying that
Freud had a narcissistic investment in his theory, and that to have this fruit of his mind challenged would have been a great blow. Rather than have one's theory demolished, a little slippage in the interpretation of the data might have been a more acceptable compromise.

Yet beyond the substitution of theory for data lies still another abuse of theory which I refer to as the substitution of ideology for data. This kind of substitution is far more difficult to deal with and far more divisive to the community than is the theory-data abuse, because it is based on strongly held, narcissistically charged positions. One might say that this should not even be considered as abuse of theory, as theory in the ordinary scientific sense is not involved. But it results in an abuse of theory, nonetheless, both because the intellectual issues are couched in terms of theory, and because the ideology stems most frequently, in our field at least, from old bypassed theories, themselves based originally on data acquired through the psychoanalytic process.

The ideas of almost all major figures in the psychoanalytic firmament are, or have been, involved in such an abuse. For example, the theoretical power of the Oedipus complex, as created by Freud, to explain very important aspects of development, as well as of psychopathology, was so great that it came to dominate depth psychological thinking for decades. Gradually the theory of the Oedipus complex came to be seen by some as limited in scope rather than as the more or less universal explanation of all psychopathology. Those psychopathologies whose etiologies could not be understood as ultimately derived from preoedipal developmental sources were explained as resulting from a regression from the Oedipus. Or, to stretch the thesis a bit further, the Oedipus came to be seen as a kind of psychic funnel. All psychopathology would be understood to pass through the Oedipus and to be shaped by it, whether the problem in development stemmed from pre- or posteoedipal sources.

The fact that oedipal theory came to be modified in these ways was scientifically unexceptional. At the time these modifications were invented, there was not enough of a grasp of developmental considerations to do any better. And the theory of the Oedipus was still useful as an overriding construct. Moreover, as we began to understand early pathology—borderline, gender issues, very early disturbances in the mother–infant experience resulting in severe character pathology, and some forms of psychosis—disturbances related to the Oedipus proper were relegated to an ever smaller range of the psychopathological and developmental spectrum, and the Oedipus was dethroned as the exclusive explanatory agency.

It was at this point that, for some, the Oedipus became visibly ideological. No matter how great the number of clinical observations that could better be explained by other means, some adherents of what we might now refer to as the oedipal ideology (or mythology, as some suggest) insisted that the Oedipus complex was and would always remain the preeminent clinical psychoanalytic propo-
sition. Those who deviated were sometimes treated as enemies rather than as honest workers with a different view based on different interpretations or different observations. Groups formed and loyalty was tested by degree of ideological purity. Such groups were based on age, geography, and attachment to one or another idealized figure. The abuse is not in the arguments for or against the centrality of the Oedipus; the abuse is in making an ideology out of a venerable, but old, somewhat limited theory. The Oedipus complex retains its utility, not as a universal explanation and a test of loyalty, but as an explanation of some developmental psychopathology.

The theory of the Oedipus complex is only the first in the field to have become degraded by some into an ideology. In more recent years, we have seen much the same fate befall the novel ideas of Winnicott, Mahler, Kernberg, and Kohut, to mention only the more prominent. Each of them made observations and developed theories based on new observations—observations that were beyond the capacity of existing theories to explain. Just as with Freud, groups formed with powerful loyalties to the now idealized theorist and to his or her ideas. Unfortunately all too often the preeminent need, I believe, is for the safety and security provided by an attachment to an idealized figure in distinction to the insecurity of relative insularity and uncertainty.

These abuses of theory can be seen as regressive in that the analyst’s capacity to function at a high cognitive level is compromised when subjected to their influence. From one perspective theory can become, analogous to a transference, something that has the potential for distorting reality.

I wish to conclude with a comment on where we are headed in terms of theory. It has been almost a hundred years since Freud proposed a developmental schema or model for psychoanalysis. The original oral, anal, phallic progression served us well and was, with time and experience, refined and modified. In fact, it has been so modified that, except in college courses, we now hear little about it. But I believe it was not until 1973, when Gedo published his Models of the Mind with Goldberg, that it became possible to conceptualize the study of mind in an organized manner. The system of hierarchical models does not fall if a particular theory along either the horizontal or vertical axis is modified or even found to be entirely faulty, because a successful assault on the concept of epigenetic development is presently inconceivable. It is not, as the authors suggest, a theory in the conventional sense of theory, but rather a schema for the organization of data, theories, and, potentially, all manner of research studies in our field. Gedo is aware that no grand, all-encompassing theory is likely to become available, just as he knows that we need not wait for the Messiah to help us straighten out our theoretical quandaries.

Perhaps a better sense of the scope of the sets of hierarchical models would be conveyed by calling the whole idea a model matrix. The hierarchical model, in the sense of a model matrix, makes it possible to more readily conceptualize
a merging of data from neurophysiologic, as well as from cultural/historical studies with analytic data in order to create theories and derivative data useful for both. The issue of whether nature or nurture is the more important factor thus fades in significance within such a developmental matrix or epigenetic schema. In the relatively near future, I believe, we will increasingly see new integrated mind-brain theories that will alter our developmental concepts and our clinical techniques. As I attempted to demonstrate earlier, there is extraordinary complexity to the structure of data in psychoanalysis. This, together with some formidable obstacles to theory construction and testing in the ordinary scientific manner, makes a traditional scientific approach in psychoanalysis very difficult.

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Preliminaries for an Integration of Psychoanalysis and Neuroscience

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It is not difficult to understand why the relationship between psychoanalysis and neuroscience should interest us. Psychoanalysis is a science of the mind, and we have known since ancient times that the activities of the mind are in some intimate way connected with the tissues of the brain. This connection was established, from the start, on clinical grounds. Physicians through the ages recognized that diseases of the brain—unlike those of any other organ—had immediate effects on the functions of the mind. The celebrated case of Phineas Gage, which was first reported in 1848, is classically cited in this context (Harlow, 1948, 1968). A tamping rod passed through the frontal lobes of his brain, with the following results: "His physical health is good, and I am inclined to say that he has recovered...[but] his mind was radically changed, so decidedly that his friends and acquaintances said that he was 'no longer Gage'" (Harlow, 1868). Observations such as these, which demonstrate that the brain and the personality are inextricable, make it clear that the object of study in psychoanalysis is somehow intrinsically connected with the object of study of neuroscience.

Freud himself recognized this fact in his neurological writings, and he continued to acknowledge it throughout his psychological writings. Nevertheless psychoanalysis developed almost completely independently of neuroscience. We all know the reason for this: Despite the fact that Freud acknowledged that 'the mental apparatus...is also known to us in the form of an anatomical preparation,' as he put it (Freud, 1900, p. 536), he nevertheless always recommended that psychoanalysts should remain aloof from neuroscience. There seems at first sight to be a contradiction in this stance, but I will clarify Freud's position in a moment.

The mere fact that psychoanalysis and neuroscience developed separately for so long points to the reality that, notwithstanding the obvious connection between

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the two fields, there is a great deal that separates them. Leaving aside the philosophical complexities of the mind/body relation for present purposes, it can safely be said that in practice psychoanalysis and neuroscience have separate objects of study, that they bring different methods of investigation to bear on these objects, and that the knowledge they generate is therefore of two distinct types.

This poses obvious problems for those of us who wish to forge links between these two bodies of knowledge, as can be seen from the literature that has begun to accumulate at the interface between them over the past few decades. The first investigator to explore this relationship was, of course, Freud himself. In the mid 1890s, he composed a series of drafts on the subject, one of which has survived to this day in the form of a document known to us as the “Project for a Scientific Psychology.” In that work Freud (1895) attempted to translate what was known at the time about the deeper workings of the mind into the language of neurophysiology and anatomy. The method that Freud (1954) employed to achieve this translation was, as he himself acknowledged, one of “imaginings, transpositions and guesses” (p. 120; emphasis added). In other words, Freud relied on speculation. At that time (i.e., in the 1890s) the gap between the knowledge that Freud had obtained by the putative method of psychoanalytical investigation about the inner workings of the mind and the knowledge that was available to him from physiological and anatomical methods of study about the inner workings of the brain was so large that he had no choice but to fall back on speculation when trying to bridge it. This gap played no small part in Freud’s eventual abandonment of his “Project,” and his description of it as “a kind of aberration” (p. 134). By 1900 he had concluded that “in the end I may have to learn to content myself with the clinical explanation of the neuroses” (p. 137, emphasis added; cf. Solms & Saling, 1986). This remark about clinical explanation, as you will see shortly, is pregnant with implications for our science.

It is my contention that the cause of Freud’s failure to integrate his clinical findings with the neuroscience of his day not only was the paucity of neuroscientific knowledge that was available to him in the 1890s, but also the absence of a suitable method for relating the neurological and psychological data that were available. I believe further that, despite the rapid and exponential increase in our knowledge in all branches of neuroscience, every subsequent attempt to correlate psychoanalytic and neuroscientific knowledge has stumbled on the same basic problem that Freud did 100 years ago, namely, the failure to develop a valid method for relating the clinical findings of psychoanalysis with the type of knowledge that is generated by the various neurological sciences. Every investigator who has written on this subject since Freud¹—despite the

brilliance of some of their intuitions—has relied on the same fundamental methodology that Freud did regarding the actual manner in which they correlated the two fields, namely, speculation.

These are some of the reasons why we are now in a situation, with the sudden increase of publications in this area over the past few years, where we have a number of competing and in many respects contradictory models of the neurological organization of the deep mental functions we study in psychoanalysis, without us having any rational basis for deciding between them. How are we to decide between the rival points of view? I am sure you will agree that we ought to be able to decide such questions for, if the mind and the brain both function in regular and lawful ways, and if those functions and regularities are related to each other in similarly lawful ways—as we have every reason to believe that they are—then it should be possible for us to decide such questions in ordinary scientific ways.

My primary aim in this essay is to introduce you to a method by which we can achieve this ordinary scientific task. I intend to do so, first, by telling you something about where this method came from; second, how it works; and third, by reporting very briefly some of the findings that this method is beginning to produce about how the deeper strata of the mind are organized neurologically.

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To do that, I want first of all to take you backward into history, to trace the origins of psychoanalysis to a particular branch of neuroscience, and to show you how the psychoanalytic method grew out of that branch; then I want to trace subsequent developments in that field to show you that it still remains the natural point of contact between our two disciplines. In the process I hope to be able to demonstrate that—just as we find in our clinical work—a problem, which seems insolubly complex in its present, mature form, frequently turns out to have a relatively simple structure when one traces it back to its origins.

To start at the beginning, Freud began his scientific career as a neuroanatomist, before, following a brief flirtation with psychopharmacology, he turned his attention to the problems of clinical neurology. By the time that Freud came to clinical neurology, it was still a very young discipline, which rested almost entirely on a single method. That method was known as clinico-anatomical correlation, which was carried over to the new speciality of neurology by some of the ablest practitioners of the art of internal medicine. As its name suggests, internal medicine concerned itself with the diagnosis and treatment of diseases...
occurring in the interior of the body, which could for that reason not be apprehended directly in the living clinical case, but rather had to be inferred from their indirect manifestations in the form of external symptoms and signs. One had to wait for the death of the patient, and the pathologist’s report, before one could determine conclusively whether one’s diagnosis was correct. But with the accumulation of experience over generations, regarding what sort of clinical presentation during life tended to correlate with what sort of pathological-anatomical findings at autopsy, it gradually became possible for internal physicians to recognize pathognomonic constellations of symptoms and signs, and thereby to predict with reasonable accuracy what the underlying disease process was, and to conduct the treatment accordingly. This was the origin of the concept of clinical syndromes, a concept with which I presume many of you are familiar.

Neurology became a separate speciality of internal medicine as it became increasingly evident, not only that the brain—like any other organ—was subject to its own special pathologies peculiar to its tissues, but also that damage to different parts of the brain produced a wide variety of different clinical manifestations. When Freud trained in clinical neurology in the early 1880s, this was the art that he learned: rational diagnosis and treatment of neurological diseases by the syndrome method, based on knowledge obtained by the method of clinico-anatomical correlation. In fact, we are told that Freud was a particularly gifted practitioner of this art (Jones, 1953). He published a series of articles at the time attesting to his skill.

Now because, as I said at the outset, brain lesions cause mental changes, the clinico-anatomical method could be, and was, also put to another use, namely, the localization of mental functions. In the early 1860s, Pierre Paul Broca demonstrated conclusively that disease in a particular part of the brain produced a highly characteristic mental symptom, namely, loss of speech. On the basis of this clinico-anatomical correlation, Broca localized the faculty of speech to that small part of the brain. Ten years later, Carl Wernicke demonstrated that damage to a different part of the brain produced a different mental symptom, namely, loss of the capacity to understand spoken language—and he too localized that function accordingly. These two seminal discoveries were followed by a rapid series of clinico-anatomical correlations in regard to a variety of other mental functions, such as skilled movement, object recognition, and even “intelligence.” On this basis a wide range of psychological faculties were localized within a mosaic of so-called “centers” on the surface of the hemispheres of the brain. This was the origin of a subspeciality within the neurological sciences known as behavioral neurology.

We know from Freud’s writings of that time that he was thoroughly versed in the methods and discoveries of this exciting new branch of science. In fact there is abundant evidence to suggest that the clinico-anatomical localization of mental functions was a subject of special interest to him (Freud, 1888, 1891, 1893–94). Clearly then, Freud was aware, before he conceived of psychoanalysis, that
there was a well-established method by which it was possible to correlate mental functions on a clinical basis with the functions of particular parts of the brain. But if that was so, it raises the question, *Why did Freud not use this method to identify the neurological correlates of the psychological processes that he later discovered? And why don’t we use it to do so today?*

As I have said, Freud was an unusually gifted physician, and it didn’t take him long to master the syndrome method in his diagnostic work, and the clinico-anatomical method in his ongoing research. It also did not take Freud long to discover the limits of this method. He soon came to the conclusion that it was, as he put it, just “a silly game of permutations” (Bernfeld, 1951, p. 214). This is how it happened. Although it is true that the clinico-anatomical method was the only viable research technique available to the nineteenth-century neurologist interested in mental functions, it was in fact used in subtly different ways within two rival schools of neurology. In the Austro-German school, within which Freud was initially trained, the emphasis fell squarely on the *anatomical* side of the clinico-anatomical equation. According to this school, the primary aim of neurological science was not simply to recognize which syndromes correlated with which lesions, but rather to *explain* the mechanism of the clinical phenomena—and thereby the corresponding normal mental functions—in anatomical and physiological terms. This approach reflected the broader ideals of the Helmholtz school of medicine.

In the rival, the French school of neurology, on the other hand, the emphasis fell very much on the *clinical* side of the clinico-anatomical equation. According to this school, which collected around the personality of Charcot and the famous wards of the Salpêtrière Hospital, the primary task of neurological science was not so much to *explain* the various clinical pictures, but rather to identify, classify, and *describe* them. The following quotation graphically illustrates the difference between these two ways of applying the clinico-anatomical method:

"Charcot . . . never tired of defending the rights of purely clinical work, which consists in seeing and ordering things, against the encroachments of theoretical medicine. On one occasion there was a small group of us, all students from abroad, who, brought up on German academic physiology, were trying his patience with our doubts about his clinical innovations. "But that can’t be true," one of us objected, "it contradicts the Young-Helmholtz theory [of vision]." He did not reply "So much the worse for the theory, clinical facts come first" or words to that effect; but he did say something which made a great impression on us: ["Theory is good; but it doesn’t prevent things from existing"] [Freud, 1893a, p. 13]."

This was one of Freud’s favorite anecdotes.

As is well known, during his period of study at the Salpêtrière in the mid 1880s, Freud moved from being under the direct, personal influence of some of the leading figures of the Austro-German school of neurology to being under the
direct personal influence of Charcot. This shift had a decisive influence on his thinking, and, in particular, on his attitude to clinico-anatomical localization.

The reason for this shift was simple. Although the differences between the German and French schools of neurology complemented each other well in regard to most physical neurological disorders, with the one school emphasizing the anatomical and the other the clinical side of the equation, there was one group of diseases—considered at the time to fall under the domain of neurology—that threw the differences between the two approaches into sharp relief. I am referring to the neuroses, and to hysteria and neurasthenia in particular, where no demonstrable lesion of the nervous system could be found at autopsy to account for the clinical symptomatology observed during the life of the patient. This posed no serious problems for the French school: Charcot simply proceeded to describe the pathognomonic clinical syndromes of hysteria and neurasthenia as he had done with countless other “nervous” diseases. The neuroses were for Charcot, as Freud wrote at the time, “just another topic in neuropathology” (1893a, p. 20). However, for the German school of neurologists, the problem was well nigh insoluble. How was one to explain in anatomical and physiological terms the mechanism of a clinical syndrome which had no pathological-anatomical basis? As a result, some German neurologists, Freud’s teachers among them, developed elaborate speculative theories, whereas others simply declared that the neuroses were not fit subjects for serious scientific attention. If there was no anatomical lesion, there was no clinical syndrome.

During the crucial period that Freud studied under Charcot, this was the subject that most preoccupied him. Initially Freud became a devoted pupil of Charcot, and upon his return to Vienna, he expounded his views whenever and wherever he could—much to the irritation of his old teachers. However, with increasing clinical experience, and under the influence of the English neurologist John Hughlings Jackson, Freud gradually began to edge away from Charcot and to develop a viewpoint which was rather unique at the time. Charcot was content merely to describe the clinical syndromes of hysteria and neurasthenia—on the assumption that their pathological-anatomical correlates (which he believed had an hereditary etiology) would eventually yield to advances in microanatomical and other laboratory techniques. Freud, on the contrary, came to the view—some time between 1887 and 1893—that an understanding of these clinical syndromes would never be found in pathological anatomy, or at least not by the method of clinico-anatomical correlation. He based this conclusion on two major observations, which he had first made in regard to another subject in neurology, a subject that had revealed to him the limits of the clinico-anatomical method. This subject was the problem of aphasia—that is, precisely the subject to which the clinico-anatomical method had first been applied for the localization of mental functions—by Broca and Wernicke—20 or so years before.

First, Freud (1891) observed that psychological faculties are complicated things, which have their own compound internal organization, and that these
faculties break down according to the functional logic of their own internal construction, not according to the structural laws of cerebral anatomy. The laws of psychological functional systems therefore need not have any direct relationship to the structural layout of the nervous system. For this reason, Freud concluded, psychological syndromes need both to be described and to be explained in their own psychological terms. Freud's second observation, closely related to the first, was the following: psychological functions are, in their essence, dynamic processes; they arise out of a complex interplay of forces between more elementary component functions, and they are constantly restructuring and re-adapting themselves to changing circumstances. Their physiological correlates can therefore never be localized within discrete anatomical centers; they must be thought of as processes—the dynamic resultants of interactions between the static elements of the nervous system.

It is of crucial importance for us to note that Freud first made these observations, not with reference to hysteria or any other neurosis, but rather in a study of aphasia—that is, a syndrome that can only ever occur in the context of a definite brain lesion; in other words, these were conclusions that Freud arrived at while he was still a fully fledged neurologist. This is underlined by the fact that he quickly went on to make similar observations in regard to nonpsychological, but equally complex, functions of the brain. In his writings on the disorders of movement that occur in cerebral palsy, for example, Freud went out of his way to demonstrate that they could not be localized. In a series of monographs on the subject (Freud and Rie, 1891; Freud, 1893b, 1897), like in his book on aphasia (1891), Freud appealed to dynamic developmental factors, rather than static anatomical ones, to explain the various movement disorders in terms of specific breakdowns of the complex functional system that supports them.

It was only later that Freud applied these principles to psychopathology—between 1893 and 1900—which is when psychoanalysis was born. This is a fact of critical importance, because in the next section of this essay I want to demonstrate how these principles were subsequently developed and expanded within the field of neurology, and how a neuroscientific method for studying the cerebral organization of mental functions was eventually established on precisely these principles. That is obviously of central importance to us, in our quest for a method by which we may rejoin psychoanalysis with neuroscience.

But before I move on, let me recap and summarize Freud's standpoint. He trained in the clinico-anatomical method of localizing mental functions, within the Austro-German school of neurology, which emphasized the goal of physiological and anatomical explanation. Then he shifted allegiances to the French school, which emphasized the clinical side of the equation: the elucidation of pathognomonic clinical syndromes. He used this clinical-descriptive approach to make a number of highly valued contributions to neurology, first in studies of aphasia, then of cerebral palsy, and finally of neuroses. In the process of doing
this work, Freud rejected the clinico-anatomical method of localizing mental functions—indeed of localizing any complex functions—within circumscribed anatomical centers. Freud was forced to conclude that the clinico-anatomical method could only be used to localize the most elementary functions, corresponding in the mental sphere to our primary sensory modalities (of vision, hearing, taste, etc.), but that it was quite impossible to localize the neurological organization of whole mental faculties, which have supraordinate principles of organization based on their own internal construction, which constantly changes in the process of development, and in their adaptation to unfolding circumstances. For Freud, such complex functions arise out of the dynamic interplay of a variety of more elementary functions. He concluded that we should conceive of this interplay as occurring between the elementary structures of the brain, and therefore forego the temptation to localize them within those elements themselves. It was obvious to Freud, schooled as he was in the art of meticulous clinical observation, that the essential factors in the etiology and mechanism of the neuroses arose out of complex dynamics of this kind, and that they could therefore never be localized. This led Freud the neurologist to generalize the conclusions that he had reached in regard to speech and language and voluntary movement to the whole mental field, and to write the following fateful words in The Interpretation of Dreams, which marked the final split between psychoanalysis and the clinico-anatomical method:

I shall entirely disregard the fact that the mental apparatus with which we are here concerned is also known to us in the form of an anatomical preparation, and I shall carefully avoid the temptation to determine psychical locality in any anatomical fashion. I shall remain upon purely psychological ground, and I propose simply to follow the suggestion that we picture the instrument which carries out our mental functions as resembling a compound microscope or a photographic apparatus, or something of the kind. On that basis, psychical locality will correspond to a point inside the apparatus at which one of the preliminary stages of an image comes into being. In the microscope or telescope, as we know, these occur at ideal points, regions in which no tangible component of the apparatus is situated [1900, p. 536, emphasis added].

What Freud retained, however, and carried over into the new field of psychoanalysis, was almost everything else he had learned as a neurologist. That is, he continued to rely on the clinical-descriptive methods of the French school of neuropathology, with its special emphasis on the careful study of the individual clinical case, and the identification of regular patterns of symptoms and signs with particular pathological significance, and he continued to explain the clinical phenomena in terms of underlying natural forces and energies, as he had been taught to do by his original masters in the Helmholtz school of medicine. He also continued to believe that these forces and energies were ultimately some-
how describable in physical and chemical terms. All that he abandoned was the notion that psychological processes, which have complex and dynamic functional organizations, can be localized in discrete anatomical areas. Henceforth, rather than attempt to explain a clinical syndrome by correlating it with hypothetical damage to one or another anatomical region, as even Charcot did, Freud investigated the internal psychological structure of the syndrome and explained it by reference to a complex functional system, which he assumed to be dynamically represented between the elements of the brain.

That is why Freud continued to acknowledge throughout his scientific life that the model of the mental apparatus that he devised to account for his clinical observations was a provisional construct, a system of functional relations which must be represented somehow in the tissues of the brain, and that is why he continued to insist that we in psychoanalysis should “not mistake the scaffolding for the building,” and so on. I am sure you are all familiar with Freud’s many comments to the effect that psychoanalysis will someday be rejoined with neuroscience. I want only to remind you that he always insisted that this would not be possible until neuroscience developed a method that was capable of accommodating the complex, distributed, and dynamic nature of the human mental process. I will read just one quotation of this sort, written in 1939, the year of Freud’s death:

The psychical topography that I have developed . . . has nothing to do with the anatomy of the brain, and actually only touches it at one point. [Freud is referring to the primary sensory modalities of the perceptual system.] What is unsatisfactory in this picture—and I am aware of it as clearly as anyone—is due to our complete ignorance of the dynamic nature of the mental process [p. 97].

Until that was understood, Freud insisted, psychoanalysis should continue to investigate and understand the functional organization of the mental apparatus in its own terms, using a purely clinical method, disregarding its anatomical representation.

This places psychoanalysis in a very particular relationship to the neurological sciences. It places its fundamental assumptions and basic method within a well-established tradition in behavioral neurology, a tradition that has always been closely associated with the clinical-descriptive emphasis first promulgated by Charcot, and that, following Hughlings Jackson, has always rejected the notion that complex mental faculties can be concretely localized in the brain. I am referring to the dynamic school of neurology, which has been associated through the years with such outstanding physicians and theoreticians as Constantin von Monakow, Pierre Marie, Henry Head, Kurt Goldstein, Aleksandr Romanovich Luria, and, most recently, Jason Brown.

The influence of this branch of neuroscience has waxed and waned over the decades. Currently it is increasing enormously, as functional imagery and
computer simulation studies have revealed the fundamentally nonlocalizable and dynamic "parallel distributed processing" that underlies all mental functioning, and indeed all complex functions of the brain. The clinical emphasis of this branch of neuroscience, on the other hand, is on the wane; with the enormous strides that have been made in the use of technological auxiliary aids in medicine, the art of clinical judgment is no longer so highly valued, and the human factor in medicine is being lost. Ironically, one could say that psychoanalysis stands together with this branch of neurology as one of the last outposts of the great clinical traditions of internal medicine.

The important point for our purposes (looking forward rather than backward) is that Freud carried over from neurology into psychoanalysis a basic method—namely, the clinical-descriptive method, or the method of syndrome analysis as it later came to be known—and a basic conceptualization of brain-behavior relationships—namely, the antilocalizationist or dynamic conceptualization, which gives pride of place to psychological methods of analyzing mental syndromes, regardless of whether those symptoms have an organic basis. This method, and these basic principles, have determined the object of study of psychoanalysis, the way we go about studying it, and, most important of all, the sort of knowledge that psychoanalysis generates.

Now if we wish to integrate knowledge of this sort with knowledge about the brain, then our natural point of contact is with that branch of neuroscience which shares our basic assumptions, and out of which psychoanalysis grew, that is, the dynamic school of behavioral neurology—or neuropsychology as it later came to be known. If we try to relate our clinically generated psychoanalytical knowledge with knowledge about the brain generated by fundamentally incompatible methods, or by methods that Freud explicitly rejected, then we not only are confronted by the insoluble problem of having to rely on speculation (as I said before), but we also have to recognize that we may be doing violence to the basic premises upon which our discipline was built. I am sure you will agree—and this was always Freud’s most fundamental viewpoint on the matter—that there is little point in rejoining psychoanalysis with neuroscience, if it means that we have to abandon all that psychoanalysis stands for in the process.

2.

What I would like to do now is describe to you one of the major developments that has occurred since Freud’s death in the branch of neuroscience out of which psychoanalysis arose, because I believe that this development provides us with a method by which we can rejoin psychoanalysis with neuroscience in a way that is compatible with Freud’s basic assumptions.

During the early 1920s, a young Russian psychologist wrote to Freud to apply for formal recognition of a new psychoanalytical society he had formed, in the Eastern city of Kazan. This man was Aleksandr Romanovich Luria. Freud
granted the recognition, and a brief correspondence ensued. A few years later Luria moved to Moscow, and joined the Russian Psychoanalytical Society. Over a period of about ten years, Luria conducted a wide range of psychoanalytic research; published a huge number of articles, monographs, and brief reports; and conducted clinical work in a local psychiatric hospital, including (it is rumored) the analysis of Dostoevsky's granddaughter. Luria was drawn to psychoanalysis, he wrote, because it was the only branch of psychology that was both solidly rooted in natural science and studied the living experience of real human beings.

However, the tide of political opinion soon turned against psychoanalysis in the Soviet Union, and by the early 1930s, fearing for his academic future, if not his life, Luria resigned from the Russian Psychoanalytical Society, abruptly ceased all psychoanalytic activities, and delivered a penitent speech in which he admitted to his ideological mistakes, namely, according to the party line of that time, that psychoanalysis "biologized" human behavior and ignored its social origins. This was a surprisingly naive remark coming from somebody with so complex an understanding of Freud's teachings, but that was not the point. Interestingly there is evidence to demonstrate that Luria never gave up his private interest in psychoanalysis, whatever his public pronouncements. Consider for example a letter he wrote to Oliver Sacks in the mid 1970s, in which Luria described the verbal tics of a patient with Gilles de la Tourette's syndrome as an introjection into the superego of the father's punitive voice (personal communication from Oliver Sacks to the author, March 17, 1987).

It is also very striking, in view of the charge that psychoanalysis biologized human behavior, to observe what Luria did next (after resigning from the Psychoanalytical Society). He went to medical school, specialized in neurology, and then immediately set about studying the mental symptoms of his neurological patients. And his first piece of research in this field—his doctoral thesis in fact—was on the exact same subject that was preoccupying Freud when he left that field some 40 years before, that is, he studied the subject of aphasia.

When Luria finally published the results of his efforts, in 1947, in a monograph in which he scrupulously avoided the name of Freud, he proposed a theory of the cerebral representation of language which was remarkably similar to the one that Freud had proposed in 1891 (Luria, 1970). I am skipping over the details here, but would like nevertheless to reproduce one brief quotation. Consider the striking similarity between Freud's suggestion that we view the mind as a complex optical instrument in which psychical locality corresponds to an ideal point in which no tangible component of the apparatus is situated, and the following statement by Luria: "[A]ll attempts to postulate that . . . ideas could be found in single units of the brain were as unrealistic as trying to find an image inside a mirror or behind it" (1987, p. 489). However, Luria went a step further than Freud; and this represented the essential advance that he contributed to behavioral neurology, or neuropsychology, as he preferred to call it.
Luria described his approach as a "neurodynamic" one. He used the following analogy to illustrate the principle:

Most investigators who have examined the problem of cortical localization have understood the term *function* to mean the "function of a particular tissue." . . . It is perfectly natural to consider that the secretion of bile is a function of the liver and the secretion of insulin is a function of the pancreas. It is equally logical to regard the perception of light as a function of the photosensitive elements of the retina and the highly specialized neurons of the visual cortex connected with them. [You will recall, this was the type of function that Freud believed could be localized.] However, this definition does not meet every use of the term *function*. When we speak of the "function of respiration," this clearly cannot be understood as the function of a particular tissue. The ultimate object of respiration is to supply oxygen to the alveoli of the lungs to diffuse it through the walls of the alveoli into the blood. The whole process is carried out, not as a simple function of a particular tissue, but rather as a complete functional system, embodying many components belonging to different levels of the secretory, motor, and nervous apparatus. Such a "functional system" . . . differs not only in the complexity of its structure but also in the mobility of its component parts [1973, p. 27].

The same could be said of, for example, the function of *digestion*. Luria went on to argue that mental functions, too, can only be localized in this distributed, dynamic sense. In order to identify the different component parts which together make up the complex functional systems of the human mental apparatus, Luria devised a *new* method of clinico-anatomical correlation, known as "dynamic localization." The method works like this: If one wishes to identify the neurological organization of a complex psychological function, one's first task is to identify all the different ways in which that function breaks down with focal neurological disease in different parts of the brain. Luria described this first step as "qualification of the symptoms." One starts with each of the different ways in which the function under study breaks down, and then carefully explores the *psychological structure* of each of these symptoms, identifying precisely in what way the functional system has collapsed in each case. This is done by using psychological methods of analysis in individual clinical cases.

The second step in Luria's method is called "syndrome analysis." That is, one examines what *other* functions are disturbed, apart from the primary function under scrutiny, in each case. Again one relies exclusively on psychological methods of investigation, and one seeks to clarify the internal structure of these other, interconnected symptoms, in order to learn what they have in common with the function that is the primary focus of attention. In this way one identifies a single, *underlying* factor which can account for the full range of surface clinical manifestations.

Once you have identified the common underlying factor producing a range of psychological symptoms, you not only will have learned something about the
deep psychological structure of the syndrome in question, you also will have identified the component function that is contributed by the part of the brain that is damaged in that syndrome. In other words, you will have identified the elementary psychological function of one particular part of the brain. This is a major advance.

Once one has studied, by this method, the full series of different ways in which a complex psychological faculty breaks down with damage to each part of the brain, then one will have discovered its distributed neurological organization, by identifying which parts of the brain contribute, and in what way they contribute, to the complex functional system subserving that faculty as a whole. One will not have localized that faculty in any one part of the brain, but one will have identified the various component elements between which, by dynamic functional interaction, that psychological faculty is represented.

To my mind this method of Luria’s marks a major step forward, because it enables us to identify the neurological organization of any mental function, no matter how complex, without contradicting the fundamental assumptions upon which our own discipline was built. By this method, complex psychological functions are still understood in their own, psychological terms; their dynamic nature is respected theoretically and accommodated methodologically; they are not reduced to anatomy and physiology, although their neurological distribution is laid bare; and something new is learned about their internal functional organization. By this method a viable bridge is established between the concepts of psychology and those of anatomy and physiology and all the other branches of neurological science.

I hope I have not made the neuropsychological method of syndrome analysis sound too complicated, because it really is very simple. I truly believe that this method represents the breakthrough that Freud was waiting for. That is to say, I believe that it enables us to chart the neurological organization of everything that we in psychoanalysis know about the structures and functions of the mind.

3.

What I would like to do now is give you an example of how this method—which I am claiming is the natural point of contact between psychoanalysis and neuroscience—works in practice. I have chosen for my example a piece of research that I recently completed (Solms, 1997) into the neurological organization of a mental function that is of special interest to psychoanalysis. I am referring to the function of dreaming.

Using Luria’s method to study the dreams of 361 patients with neurological lesions, my research revealed that dreaming is disturbed by damage to six different parts of the brain.

Let me first of all describe the primary effects on dreaming caused by damage to each of these parts of the brain. If the brain is damaged in the white matter
of the mediobasal frontal region, or in the inferior parietal region of either hemisphere, the conscious experience of dreaming stops completely. This clinical fact tells us that the basic functions contributed by these three parts of the brain are fundamental to the whole process of dreaming, for when any one of them is damaged, the manifest dream is obliterated entirely. Why that should be the case is revealed in an analysis of the psychological syndrome within which the loss of dreaming is embedded. I return to that point in a moment.

First let me describe the other ways in which dreaming is disrupted by neurological disease. If the brain is damaged in the ventral occipito-temporal region, then the conscious experience of dreaming persists, but the patient's dreams are devoid of any visual imagery. Strange as it may seem, patients with damage to this part of the brain have completely nonvisual dreams. (Cases have also been described in which only selected aspects of visual imagery are disturbed—such as, for example, color imagery.)

If, on the other hand, damage is situated in the proximity of the temporal-limbic region, and if the lesion is accompanied by a discharging focus (that is, by seizure activity), then the patient experiences recurring, stereotyped nightmares. These nightmares stop if the seizure disorder is brought under control.

Finally, if the damage is situated in the frontal-limbic region (including the anterior cingulate gyrus and basal forebrain nuclei), the patients experience a massive increase in the frequency of dreaming; they sometimes experience continual dreaming; and they have great difficulty in distinguishing between dreams and real experiences.

So these symptoms qualify the different ways in which dreaming can be disrupted by damage to the human brain. Now as I have said, in order to discover what the cause of the breakdown of dreaming is in each of these six instances, it is necessary to study the constellation of other psychological symptoms which accompany the changes in dreaming, following damage to each of these areas. This enables the investigator to isolate the elementary underlying factor, which is common to all of these symptoms, and which is therefore contributed by the part of the brain in question to the overall process of dreaming.

So what are the six elementary factors that are contributed by each of these parts of the brain? Unfortunately, due to limitations of space I cannot describe the full richness of the psychological syndromes from which we have inferred these underlying factors. As a result I am going to have to oversimplify things somewhat. For expository purposes I can only say that an analysis of the psychological syndromes associated with lesions to the six areas of the brain concerned reveals the following basic factors: The mediobasal frontal white matter contributes a general motivational factor to mental functioning. The left inferior parietal lobule contributes a factor of quasi-spatial synthesis, which is fundamental for symbolic mental operations. The right inferior parietal lobule contributes a factor of concrete spatial representation. The ventral occipito-temporal
region contributes a factor of *revisualization*, which is essential for *visual mental imagery*. The temporal-limbic region contributes an *emotional arousal* factor, and the frontal-limbic region contributes a factor of *selectivity*, or of *selective activation and inhibition*, which is essential for processes such as attention, reality testing, and judgment.

These six factors together make up the functional system of dreaming, or to put it differently, the process of dreaming arises out of a dynamic interaction between these six factors, which are contributed by six parts of the brain. An analysis of the special structural and functional properties of these six different brain regions, and of the dynamic relations between them, provides a basic scientific understanding of the anatomy and physiology of dreaming.

Finally, to arrive at a truly comprehensive account of the neurological organization of dreaming, it is also necessary to study the component functions of those regions of the brain which do *not* appear to be involved in the process of dreaming. This simultaneously reveals which elementary functions of the human mental apparatus are *not* involved in the psychological construction of dreams. For the purposes of this essay, I will discuss just two of these regions I believe are of particular interest.

The first of these is a core brainstem region, the mesopontine tegmentum. Although damage to this part of the brain severely disrupts the process of *REM sleep*, the *conscious experience* of dreaming persists in these patients. This suggests an unexpected dissociation between the physiological process of REM sleep and the conscious experience of dreams (Solms, 1995, 2000). This dissociation is confirmed by the fact that lesions in the forebrain regions discussed earlier, which lead to a complete cessation of the conscious experience of dreaming, have *no effect* on the physiological phenomena of REM sleep.

The other region of interest that I want to draw attention to is the dorsolateral frontal convexity. This part of the brain is enormously important for the *executive* control of waking mental life and of voluntary *motor* activity. However, damage to this region has no effect at all on the conscious experience of dreams. This suggests, not surprisingly, that secondary process thinking and volitional motor activity have little to do with the process of dreaming.

Now if we take a step back and look at all of these factors together, we can arrive at a model of how the dynamic process of dreaming as a whole is organized in the tissues of the brain. On the basis of my research, I have proposed the following model, every detail of which is accessible to empirical verification, by a variety of neuroscientific methods.

It appears that dreaming is stimulated by an *arousal* process. The most common arousal process that stimulates a dream is the state of neurophysiological activation which regularly occurs every 90 minutes during sleep—namely, the state of REM, which is activated by deep brainstem structures. However, this is only one of the many arousal phenomena that may trigger the process of
dreaming—and it is by no means the essential one—for dreaming occurs quite normally without it. Another arousal process that can stimulate a dream is a focal discharge in the temporal-limbic region. However, this is a pathological arousal process, which cannot be bound by the dream process, and which therefore results in anxiety-dreams, or nightmares.

The next important component of the dream process is contributed by a fiber pathway in the mediobasal frontal region. This region of the brain motivates appetitive interest in the world (appetitive interest is the term that modern neurobiologists use for what we would call “libidinal interest”). This region channels endogenous arousal processes in the direction of volitional motor activity. An arousing stimulus only triggers the dream work proper if it engages this quasi-libidinal brain mechanism. The mediobasal frontal cortex to which this pathway projects also inhibits appetitive drives, and, therefore, together with the selective structures of the frontal-limbic region, they deflect the arousal process away from the (dorsolateral frontal) executive and motor systems of the brain. These latter systems are inhibited during sleep. But if the brain is damaged in mediobasal frontal cortex and the frontal-limbic region, it seems that the inhibition of these motor systems breaks down, with the result that goal-directed motor activity is instituted, and normal dreaming becomes impossible. This conceptualization of the process is supported by the fact that patients with damage to this region of the brain have severely disturbed sleep. If the brain is damaged in the basal forebrain and/or anterior cingulate gyrus, however, the disturbance of inhibition is only partial, with the paradoxical result that there is an increase in dreaming and in dreamlike thinking.

Next, assuming that there is a sufficient degree of frontal inhibition, the focus of the nocturnal arousal process shifts to the posterior systems of the brain, which regulate perceptual functions, and the higher spatial and symbolic operations, which are based on perception (inferior parietal and ventral occipito-temporal regions). This, then, becomes the primary “scene of action” of the manifest dream. Here the three other factors that I mentioned come into play: symbolization, spatial thinking, and visual mental imagery. Among these three factors, it appears that symbolization and spatial thinking are the most important ones, for in their absence, dreaming again becomes impossible, and the whole process breaks down. Visual mental imagery is a less important factor, because the entire mental process of dreaming runs its course without it, the only difference being that the final conscious product is devoid of visual imagery. I am therefore inclined to place this factor of visual representation at the terminal end of the process of dream generation that I have described.

This overall picture suggests that dreaming is a regressive mental process, both triggered by and dependent on nocturnal states of arousal. These arousal states are channeled and inhibited by the systems controlling goal-directed behavior. They are deflected away from the motor systems, toward the perceptual
systems. The higher perceptual systems represent the arousal process in the form of symbolic and spatial syntheses, which are projected regressively onto the lower visual zones. In this way the state of sleep is preserved. If, however, the nocturnal arousal process is excessive, such as occurs with seizures or defective frontal inhibition, then this sleep-protection mechanism fails, and the dreamer is disturbed, either by anxiety or by the innervation of volitional motor activity.

What Luria's method reveals about the neurological organization of dreaming, therefore, is strikingly compatible with Freud's classical theory. Also, because of the centrality of dreaming in Freud's models of the mind, it provides us with a first foothold on the anatomical and physiological representation of some crucial psychoanalytic concepts, including aspects of the libido, censorship, symbolization, topographic regression, and so on. Moreover, although I don't have time to go into all these details here, by identifying the specific tissues of the brain that are involved in the different psychological components of dreaming, it becomes possible to study the finer anatomical, physiological, and chemical correlates of that theory. That is why I am insisting that the method of dynamic localization provides psychoanalysis with a conceptual gateway to the basic neurosciences, and thereby to the enormous advances in knowledge which technological innovations in those fields have yielded in recent years. The potential benefits to psychoanalysis are so obvious that I need hardly enumerate them.

I hope that this brief and oversimplified example makes it clear enough how human mental functions are represented in the tissues of the brain, in the form of complex functional systems that arise out of dynamic interactions between a number of elementary component parts—just like an image arises out of the

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2 For example, closer analysis of the anatomical data reveals that the structures in mediobasal frontal white matter that are crucial for the generation of dreams are the basal forebrain fiber pathways that connect midbrain dopaminergic nuclei with mediobasal frontal cortex (the mesocortical-mesolimbic dopaminergic pathway). This suggests that whatever this fiber pathway does is critical for the function of dreaming (Solms, 2000). These are precisely the fibers that were targeted by the modified prefrontal leukotomy procedure which was so popular in the 1950s. There is evidence to suggest that modern antipsychotic medications act on this same pathway (Breggin, 1980). A review of the older psychosurgical literature reveals that cessation of dreaming was a common consequence of prefrontal leukotomy (Solms, 1997). Evidently whatever it was that prevented leukotomized patients from sustaining their psychotic symptoms also prevented them from generating dreams. I am unaware of any research into the effects of modern antipsychotic medications on dreaming. However, there is considerable evidence that dopamine agonists in general (e.g., L-dopa) stimulate excessive dreaming and that dopamine antagonists (e.g., haloperidol) suppress it (Sacks, 1985, 1990, 1991). If we review classical dream theory in the light of these findings, we have an empirical basis for linking the libidinal drive (or important manifestations thereof) with mesocortical-mesolimbic dopaminergic pathways. It is therefore not without interest that contemporary neuroscientists include these pathways in the "curiosity-interest-expectancy command systems of the brain...which instigate goal-seeking behaviors and an organism's appetitive interactions with the world" (Panksepp, 1985, p. 273).
compound optical instrument, as Freud (1900) suggested in *The Interpretation of Dreams*.

I hope also that this example shows how the method of syndrome analysis makes it possible to identify the component parts of the brain between which a complex mental function is distributed, and what the elementary contribution is that each of those parts contributes to the functional system as a whole. This is the scientific yield of the method that we have developed in neuropsychology over the past 60 years, since the death of Freud.

4.

Before I can end this essay, and rest my argument for an integration of psychoanalysis and neuroscience on the basis of this method, we must take account of the fact that the research I have just described studied only the *manifest* dream process. In other words, it only studied directly the effects that damage to different parts of the brain have on the conscious experience of dreaming, and it had to infer the underlying unconscious mechanisms from the manifest symptoms. This is because we cannot lay bare the full unconscious structure of a psychological syndrome by examining a neurological patient at the bedside, and still less by assessing him or her in a neuropsychological laboratory. To gain more direct access to these deeper mental strata of a patient, regardless of whether the patient has a brain lesion, we need to get to know the patient as a *person*, within an analytic *relationship*, in a reliable professional setting, within which we can win their confidence through tact and understanding, and by analyzing their resistances, and then unhurriedly observing the way in which the internal determinants of the symptoms gradually unfold in the transference, and by testing the hypotheses that occur to us in this regard in the form of appropriate interpretations, and observing the effects that these have on the subsequent analytic material, and so on. In other words, we can only properly elucidate the dynamically unconscious structure of a mental symptom by means of the psychoanalytic method.

We all know that this is not the easiest way to study a psychological syndrome, but we also know that it is the only true and reliable method when it comes to those deeper aspects of mental life that neuropsychology has left unstudied but that have always been of central concern to us in psychoanalysis, namely, the dynamically unconscious structure of the human personality. In fact, the emotional resistances which conceal the internal structure of the personality probably explain why the neurological organization of this, the most important aspects by far of human mental life, have still not been systematically explored by the method of syndrome analysis. This is the scientific contribution that I believe psychoanalysis can make to neuroscience, and this is the next step that I believe we must now take.
Ironically we owe the development of a clinical procedure for analyzing these deeper mental strata to the fact that Freud abandoned neuroscientific methods of investigation when he realized that they were (at that time) unable to accommodate the dynamic nature of human mental processes. Now it seems the time has come for us to reintroduce the fruits of his labors to the neuroscientific field out of which they originally grew. In doing so—although I do not wish to underestimate the enormity of the task before us—I believe that we will be able to gradually integrate psychoanalysis and neuroscience, on a solid clinical basis, in a way that is beneficial to both fields, without ignoring any of the valuable lessons that the pioneers of psychoanalysis fought so long and hard to learn.

What I am recommending, therefore, and what I believe will provide the essential cornerstone for a lasting integration of psychoanalysis and neuroscience, is a fully psychoanalytic investigation of patients with focal neurological lesions. In other words I am recommending that we chart the neurological organization of the deepest strata of the mind, using a psychoanalytic version of syndrome analysis, by studying the deep structure of the mental changes that can be discerned in neurological patients within a psychoanalytic relationship. If I had more space, I would have liked to describe the preliminary results of a study that my wife and colleague, Karen Kaplan-Solms and I began fourteen years ago, using precisely these methods (Kaplan-Solms & Solms, 2000). We have so far studied the subjective life of 35 patients with focal brain lesions by taking them into psychoanalysis or psychoanalytic therapy. Colleagues in America, Austria, and Germany are beginning to undertake similar studies. This research is starting to reveal the neurological organization of those deeper functional systems which only the psychoanalytic method of investigation can reveal. We report on this research in detail in our forthcoming monograph (Kaplan-Solms & Solms, 2000). Unfortunately I only have space here to make the point that it is now possible, using the methods that I have described, to elucidate the neurological organization of the deepest mental functions that we have traditionally studied in psychoanalysis using purely psychopathological material.

I hope that I have conveyed this point convincingly, despite the fact that I have only been able to hint at how my way of approaching the problem actually works in practice, and have only been able to describe a fragment of the sort of data that it generates. Nevertheless I hope that I have at least been able to convince you of the principle that this is a worthwhile way to proceed. I will know that I really have succeeded in doing so if some readers put into practice the method I am recommending, and judge for themselves if it is capable of achieving what I am claiming for it. An enormous scientific effort lies before us, so I need hardly say that the more of us who involve ourselves in it, the better.

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References

I PSYCHOANALYSIS AND NEUROSCIENCE


As a psychoanalyst contemplating Edelman’s (1992) model of the mind/brain, I have felt quite excited about the possibilities it suggests for our field. There is a cost for everything, even for good ideas, and before I go further, I want to point out some of the old and cherished beliefs and presumptions we will be prompted to reexamine, clarify, reaffirm, or perhaps relinquish as we consider Dr. Edelman’s model. There are some presuppositional differences between Edelman’s mind/brain model and most psychoanalytic models, some of which I discuss here, focusing on three: the nature of evidence or data, the unified mind/brain, and the nature of change.

I. Most immediately striking is that Edelman’s definition of evidence for ideas about the theory of the mind is that it is objective and empirically observable, like for
all natural science. This is unlike the evidence in clinical psychoanalysis, which is empathic observation of subjective states that does not meet the criteria of reliability and validity.

2. A second tenet of Edelman's mind/brain model is that mind and brain are unified as one, with the psychological mind being rooted in the biological brain processes. Many psychoanalysts would not agree, and instead they would assume that biology and psychology are separate but somehow reflect one another. This has supported a belief for many psychoanalysts that biology can be safely ignored, except in life-threatening circumstances or for very sick patients where psychopharmacology can be helpful. Among 21 22 Breaks in Consciousness in the Psychoanalytic Process another smaller number of psychoanalysts, a reductionist position has been held, when the biological brain processes are considered shadows of the mind's organization. 3. In Edelman's mind/brain model, developmental change in the life span and the reorganizational change that results from therapeutic intervention are not the same process. Most psychoanalysts do not make this distinction, and in fact would argue that successful therapeutic intervention reengages development. From a biological view, developmental change results from the interaction of genetic potentials and environmental opportunities, whereas therapeutic change is initiated only by interactions with the environmental context. I discuss how psychoanalysis has differed from Edelman's model of mind/brain for each of these points, and in the last half of the essay I make some points about consciousness from a psychoanalytic view, using case material to illustrate phenomena which are well known to psychoanalysts. I hope to make some observations about the vicissitudes in the shifts and dissociations of higher order consciousness which might be usefully considered by psychoanalysts as the basis for a dynamic systems natural science of the psychoanalytic process. For Freud and still now for many analysts, consciousness is the result of perception by the "eye of consciousness" (cf. Solms, 1997). Consciousness relies on an "eye," which is sometimes thought of as an homunculus or as an organ and specific function in the brain. For psychoanalysis, the Conscious is a container of information that can be banished to another container, the Unconscious, and then again be returned to the Conscious. This is the model that is behind the psychoanalysts' concepts such as repression, disavowal, and other defenses. Instead, for Edelman, consciousness is a spontaneous product of the biologically rooted complex mind/brain organization, a result of a
process involving multiple responses and connections throughout the brain that are influenced by the person’s interaction with that person’s immediate and past environmental context. For Edelman, consciousness, and with it the potential for self-reflection, can constantly change with the context and the ongoing reorganization of the mind/brain. I believe this view of consciousness can support and extend new ideas about the psychoanalytic process. Differences Between Edelman’s Mind/Brain Model and Psychoanalysis Nature of Evidence in Neuroscience and in Psychoanalysis Ever since 1895 when Freud chose the psychoneuroses over the traumatic neuroses to inspire his theory-making, psychoanalysis has taken the organization of fantasies in the patient’s subjective experience to be the evidence that reveals

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the morphology of the mind. For some psychoanalysts of today, it is still as

sumed that the morphology of the brain is parallel to that of the mind. Solms's

recent essay (1997) examplifies of this way of thinking, as does the work of

Bucci (1997). The psychoneuroses for Freud were the product of fantasy life in

the mind, whereas the traumatic neuroses (or actual neuroses) were rooted in a

brain-based biological response to having been overstimulated and its subsequent repetition and elaboration in fantasy. As clinicians specializing in treating

the psychoneuroses, we have been taught to follow the patient’s associations as

a guide to the organization of his mind, as the "royal road to the unconscious."

Investigations and considerations about the biology of the mind/brain have been

put on a back burner, where Freud put the actual neuroses which were thought
be caused by biological trauma of overstimulation. Since then, although there
has been lip service given to biology's influence, most of us were taught the
dualist position. In this view, biology is vaguely parallel to but separate from
psychological organization as revealed by associations, dreams, parapraxes, and
so forth. The influence of biology is sometimes attributed to constitution, as in
the complementary series, or otherwise to inherited unconscious fantasies. Most
usually the understanding of biology has been given over to the purview of other
disciplines and not thought to be particularly relevant except in cases of sicker
nonneurotic patients who might need pharmacologic intervention. In this way of
thinking, evidence directly from biology has not been important for psycho
analysis. Freud believed that the basic structure of the neurotic mind was set by bio
logically inherited fantasies in the unconscious that were originally formed by
the requirements imposed by civilization on mankind's unruly nature. With his
Lamarkian and incorrect view of evolution, all members of the species inherited
the same troublesome unruly wishes and fantasies. Counteracting the expres
sion of these unconscious wishes were civilization's pressure on the developing
child to conform to the rules and expectations of the
culture. The restraints of civilization were uniform across all times and all cultures and effected all human experiences. Early mankind's survival was contingent on acquired or learned behavior that could ensure his adaptation to the opportunities and constraints of the cultural environment. Examples of such acquired and then inherited characteristics are the admiration and competition with the father and the oedipal taboo concerning sexual intercourse with the mother. For Freud (1913, 1930) these learned beliefs and taboos eventually became the inherited species characteristics that took the form of universal unconscious fantasies and stages of development common to all people. These inherited fantasies and conflicts were thought to be inevitable and unchanging throughout the individual's lifetime. The inherited unconscious fantasies in their interaction with cultural restraints were thought to direct the developmental change of the child's mind. In conjunction with idiosyncratic environmental influences that could modify their 24 Breaks in Consciousness in the Psychoanalytic Process expression, these fantasies and wishes were responsible for the final form of the child's development and for his inevitable neurosis. Evidence for these universal unconscious fantasies and how they are distorted was to be found in the stream of associations, dreams, and other spontaneous behavior of the neurotic patient. These observations were thought by many psychoanalysts after Freud (Hartmann, 1939) to be potentially objectifiable as (natural) scientific evidence of the mind's organization. In earlier psychoanalytic models, therapeutic change was brought about by the unconscious fantasies becoming conscious, or the
strengthening of the ego, making them available for new understandings in the light of a new psychic reality. Insight was the outcome of successful interpretations in treatment. The mind as a container of universal, timeless, and unchanging unconscious fantasies was improved because distortions of universal inherited unconscious fantasies were reexamined. These distortions were due to unfortunate and idiosyncratic influences of the person's earlier life experience. The expanding of consciousness reduced the potency of unconscious fantasies, and redirected their expression. Many contemporary psychoanalysts disagree with aspects of this historically early view, although they agree that evidence for theory and technique is found in complex subjective states and experiences of mind. Their data are to be found in the patient's and their own subjective experiences. Subjectivity of another person can only be known through empathic observation. One's own subjectivity can be observed only by introspection. Neither of these observational methods of the clinical setting could meet the qualifications of natural science observation and methods because reliability and validity cannot be assured with only one observer's judgments. In this sense our clinical investigative work is very different from the biologist's, who starts with a natural science method that privileges the data of objective observations. Psychoanalysts have reacted to their differences from natural science with a sense that psychoanalytic evidence and methods can never be scientifically objective. Some, I think incorrectly (e.g., relationists and intersubjectivists), dismiss the importance of the biological brain and believe that the objective and scientific findings about the brain have no application to their work. Other psychoanalysts, I think incorrectly as well, imagine our field can be transformed into natural science if subjective observations are left aside and instead we move to observations congruent with cognitive science, neuroscience, or other "hard science." An example of this approach is seen in the work of Spence and his colleagues (Spence, Mayes, and Dahl, 1994) analyzing transcripts of audiotaped analytic sessions for the patient's pronoun use as an expression of the salience of transference at that time. This approach claims to "ground" the clinical perceptions of the psychoanalyst in "objective truth" (Strenger, 1991). Perhaps the way out of this dilemma is for psychoanalysts to agree that their clinical work is not based on natural science, yet not give up the search for systematic ways to observe and describe subjectivity as evidence against which

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to test our clinical theory. Edelman’s biology-based model of the mind/brain will of course not allow us easy solutions for our disarray. However, his biological model demonstrates a dynamic systems model which could be useful for psychoanalysis. His model includes biology, subjective experience, and the multiple forces of environment and context as key elements which interact to produce the continually reorganizing functions of the mind/brain. A model for the psychoanalytic process would also include both biology and subjective experience, along with contextual factors such as the analyst’s style and specific responses and interventions.

Mind/Brain Dualism

Edelman would have us accept his premise that the mind and brain are both anchored in biology, thus ridding ourselves of a mind/body dualism (1989, p. 213). Mind and brain are not "separate but equal," nor are they separate with one being a mere reflection of the other. Rather they are mental and biological manifestations of the same biological process of multifaceted and multilayered interactions. Clinical intervention with our patients is guided by the pragmatics of our doing what works to encourage change, because we know little from natural
science about our patients' emotional disorders. Intervention in psychoanalysis

usually is not directed by biological knowledge and theory, but is conceived to

be informed exclusively by intuition about psychological experience. In psychoanalytic treatment, we are focused on the patient's subjectivity, as it can be examined as part of the experiences in the interaction and transference between patient and analyst. Even so, Edelman's model challenges us: Can we be psychologists and still consider the biological as overarching and primary? Very little of the mental and the subjective can be observed by objective natural science methods. The brain is studied by methods of natural science, and the mind is studied by the clinical psychoanalytic method of empathic and introspective observation. Therefore our understanding of the mind and the brain do require two separate domains of evidence and investigation. Evidence from these separate investigative domains may only come together in the model we use to think about our work, a model which, like Edelman's, can be applied to psychoanalysis, as well as biology. Integrating the biological and the psychological domains with a unified dynamic systems mind/brain model is not a trivial alteration in our thinking. It is more difficult than it seems at first glance, and it is important because our models and theories have far-reaching impact on our analytic
judgment. To take one example, adopting a unified mind/brain model can profoundly affect our thinking about clinical anxiety. A dualist mind versus brain perspective on anxiety as promulgated by Freud would have us accept two types of anxiety as having different sources. Signal anxiety derives from psychological conflict, and primary anxiety derives from trauma felt on some vaguely defined biological level. Edelman’s model challenges this duality. This model posits many levels of connectivity within neuronal networks, and the Theory of Neuronal Group Connections underscores the essential simultaneity of parallel signaling at all levels of organization in the mind/brain. For instance, the signal anxiety that is the subject of self-reflective work in higher order consciousness can be connected and be parallel to primary anxiety that is more reflexively reactive and perhaps more rooted in primary consciousness. If one wishes to retain the distinction in subjective experience between these types of anxiety, they will be understood as equally biological but perhaps activated differently. They also might be different in what can most immediately influence them to change and reorganize. However, any interaction (or therapeutic intervention) that stimulates reorganization on one level will also influence reorganization on other levels as well, because the mind/brain is an integrated system. Reorganization occurs within the multiple levels of the neural network substrate, as well as in the multiple levels of meaning, experience, and behavior associated with neural substrate processes. Effective intervention can be of many kinds: (1) psychoanalytic therapeutic interpretation that is accomplished in the context of transference and utilizes verbalizable and otherwise communicable semiotic and semantic meanings; (2) psychoanalytic therapeutic enactment that utilizes behaviorally based new experiences (e.g., Shane, Shane, and Gale, 1997; Renik, 1996); (3) nonpsychoanalytic behavior and cognitive therapies; or (4) a nonpsychoanalytic psychopharmacologic intervention that is designed to alter brain chemistry. According to Edelman’s model, interventions directed to either mind or brain have a potential to influence the functioning of the brain. For patients like ours, however, we have learned that lasting reorganization occurs most dependably when
directed to the conscious self-reflective mind and when it includes a communication focusing on transference. The articulation into a verbal narrative about self-observed mutual subjectivity, that is, the transference, will widen the intervention's impact across multiple levels of meaning, experience, and behavior. In the terms of Edelman's model, the transference narrative will affect many more levels of the neural network substrate than interventions directed other ways. Therapeutic Change: Development or Reorganization? A distinction is made in Edelman's model between the resumption of derailed development and the instigation of reorganization that permits more plasticity and adaptive flexibility. In psychoanalysis, not making this distinction has created uncertainty and confusion about how to understand therapeutic change and has muddied our debate as to whether the analytic relationship is the same or different from a child-parent relationship. In Edelman's model, "development" is always reorganization but a great deal of reorganization is not development.

The term development is reserved for linear and predictable reorganizations that are robust across many individuals in many varying environmental contexts. Among Edelman's colleagues, there is lively difference of opinions about development. Esther Thelen, a developmental psychologist who has used her work to refine and extend Edelman's model, proposes a broad definition of development. Based on her experimental observations of children learning to walk, development and reorganization seem to be the same thing, both understood within a dynamic systems and hence nonlinear perspective: "Development ...

... can be envisioned as a changing landscape of preferred, but not obligatory, be
behavioral states with varying degrees of stability and instability, rather than as a prescribed series of structurally invariant stages leading to progressive improvement.

quality of a developmental stage, the stability is a function of the organism-in-context, not a set of prior instructions" (Thelen and Smith, 1994, p. 81). Here, Thelen is speaking of development as the self-organization (self is referring to the system, not the psychoanalytic "self") that occurs with the interaction of the system/organism/person with other people and the environment. Development may appear to be linear, but only because the constraints and opportunities of the environment and context are linear. Therefore, in her view, there is no "universal" or general course, and only developmental pathways as manifested by specific individuals can be studied. For Thelen, the exact course of development and change for an individual is unpredictable, and the distinction between them is blurred. Biologist Evan Balaban (1998) has a somewhat different point of view about development, which ensues from his commitment to studying genetic influences.

He has a particular interest in innate and acquired values. In Edelman’s model, the definition of value is a salience or attraction that directs response. For instance, innate values might be the newborn’s response-preference for light, a
craving for food and water, and for tactile contact. Innate values are inherited, the result of having been naturally selected. Innate values can be universals for the species, and are likely to be adaptive for survival. Through the process of associative learning, new values can be conflated with the original innate values, resulting in the emergence of acquired values. Acquired values can be much more complex. For example, they can include subjective meanings, and they can be maladaptive and responsible for intransigent psychopathology, including primary anxiety and character disorders. Balaban’s notion of development, in formed by his experimental work with cross-species transplanting of fetal tissue, rests on an interpretation of his findings that some part of a behavioral pattern is innate (the chick call) and some other part is acquired (the accompanying head movement). In his work he demonstrates the chick call is the developmental consequence of an innate value because it is expressed the same 28 breaks in consciousness in the Psychoanalytic Process regardless of context, in this case the surrounding host tissue. The accompanying head movement, however, varies according to the species host tissue surrounding the implant and is motivated by an acquired value that emerged in association with the inherited invariant value expressed by call. For Balaban, development is directed by universal inherited values that have been selected, having effects that might be expressed later in life, as well as during the earliest period of life. These universal characteristics are linear consequences of genetic forces, and these universals
genotypes) are influenced in their individual developmental expression (phenotype) by their context. This context will include factors that range from the surrounding biological tissue to the social and cultural surroundings of the organism or person. Changes in phenotype expression over the individual's life span are understood in terms of nonlinear complex systems, and hence are nonlinear and unpredictable. From this view, change in development is directed by inherited species-specific genetic factors and has a necessary linear component, with timing and direction being predictable. Other kinds of changes are due to reorganization that is based on acquired values. This other change is nonlinear and not predictable because it is given a direction by self-organizational processes that do not rely on a genetic selection process. He would believe the only responses that can legitimately be called "developmental" are those that are based on species-universal genetic values which, of course, in everyday life outside the laboratory are expressed in ways that could be influenced by contextual and environmental interactions. Theoretically, development and reorganizational change are distinguished, but in any particular case, the distinction between the developmental and the reorganizational may not be possible to make. All development (directed by universal genetic and epigenetic forces) usually takes place in the nonuniversal and highly specific context of the individual's life; the variability of context makes its course and expression unique and subject to the complexities of dynamic systems. Obviously these ideas about development versus reorganization do not settle the issue for psychoanalysis, but they can sharpen discussions on this topic. It is important for us to realize the specificity and predictability of developmental change, and that the changes we see in our patients are not predictable and specific, and therefore will frustrate our attempts to generalize about the course and outcome of treatment. Therapeutic change in psychoanalysis will be complex. It cannot be expected to be linear and predictable, and is not best understood as "getting the patient back on the track." Nor can it be understood as "filling up deficiencies," which would imply that there is an optimal, sufficient, or ideal form and outcome that gets more closely approximated (e.g., the "healthy" or "normal" adult). Instead, therapeutic change is expected to be self-organizing, and not predictable in its direction and final form. Many things will influence its course and outcome, some of which are unintended or nonobvious effects of the psychoanalytic treatment.
At the very least, we must see that there are no easy answers, and that perhaps the best guide for deciding if something is developmental or a reorganization is to apply the criterion for the developmental, that it must have stability across individuals and across social-cultural contexts. Reorganizational change, on the other hand, will be idiosyncratic to a particular individual in a specific context, and will be unpredictable. An example of a psychoanalytic developmental theory that mistakes reorganization for universal development is Erikson’s (1950) theory of epigenetic developmental tasks. This theory set out an invariant sequence in the life span. Erikson lacked an historical perspective on his own time and culture that led him to error in mistaking acquired for innate values. In retrospect it is possible that his “normal and universal stages” were given an appearance of universality by his perception of regularities within the culture of the time, and not by demonstrated universal determinants within the individuals. R. A. Spitz (1946) was another important figure who introduced developmental perspectives to psychoanalysts. However, like Erikson, he believed that critical periods in embryological development are similar to psychological phenomena in childhood and even adult development. Neither Erikson nor Spitz
distinguished between development and reorganization. Their error suggests that the most accurate view of change, whether in the life span or in treatment, is as reorganization with outcomes that are not universal, linear, and predictable. In summary, the three areas of differences between Edelman's model and psychoanalysis deserve careful thought and consideration. The first difference is about the nature of evidence. I suggest that it is not possible for psychoanalysis to give up subjectivity as evidence, but that this does not preclude the possibility for a natural science study of change in the psychoanalytic process.

Evidence from a natural science study of psychoanalytic processes of neurobiology can be put together in a dynamic systems model to advance our understanding. The second difference is dualism versus a unified mind/brain that rests on a foundation of biological science. I believe it will not be a problem for modern psychoanalysis with a dynamic systems perspective to take Edelman's unified mind/brain view, and that this can only enhance our understanding of our work. The third difference, regarding definitions of reorganization and development, will stimulate greater clarity in psychoanalysis about the meaning of development and about the limits and possibilities of therapeutic
change in psychoanalysis.

How Can Evidence from the Psychoanalytic Process Articulate with Evidence from Developmental and Biological Fields?

A common but unfortunately limited way to integrate evidence from two different fields is through a claim that events in one field of observation cause or correspond with events in the other field. For instance, neurobiologists are now doing cutting-edge research that uses Functional Magnetic Resonance Imaging (FMRI) methods to demonstrate a correspondence between the occurrence of particular affects or experiences (the experiential field) and specific areas that are activated in the brain (the neurophysiological field). Another example is found in the work of psychoanalyst Howard Shevrin and his colleagues (Shevrin, 1995). His perspective would support the claim, for instance, that a relationship between memory deficiency (cognition) and anxiety (experience), observed in a cognitive psychology paradigm, corresponds to the activation of repression caused by certain anxieties in the psychoanalytic setting. Both these examples require a linear or causal explanation where one set of events corresponds to another. To find these linear and causal connections between events, it is necessary to eliminate as much random complexity as possible. These unexpected, irregular, and often powerful forces comprise "error" and obscure the simple orderliness of one-to-one causality. That's why, for instance, Shevrin's observations are made in carefully controlled laboratory conditions. The advantage is that memory function is removed from the usual complexity of its everyday context. The operation of memory can then be seen as a closed system that is predictable, the way an old-fashioned eggbeater whips the batter when it is cranked. Of course, this very advantage that makes it function predictably is precisely what puts off the practicing clinician; the clinician will object that "it has nothing to do with what really goes on in treatment." If, however, the practicing clinician does not reject this finding as irrelevant, and instead tries to make use of it, the clinician must think of the treatment
process and the laboratory observations as parallel. This requires thinking in metaphor, making a story that whatever is observed in the clinical setting is as if it were happening in the laboratory, but arguments will ensue over what criteria are used to privilege one metaphor over another. Another much more promising approach to finding relationships between evidence from different fields is through constructing a model for the process of change. Edelman has done this in amassing evidence from many biological fields to build his model of the mind/brain. In this approach the focus is on the rules for change, regardless of the specific events that are the evidence observed. The important evidence refers to how change occurs, which is not to pursue the more distant theoretical question of why it happens. The construction of such a model uses data from many types of observational fields where change is studied, and it always involves the observation of complex systems. What gets observed in this kind of dynamic systems study? When complex systems self-organize, they settle into a fluctuation between two or several modes of behavior. Each mode is a state, which is organized around an attractor. As these ideas are applied to psychoanalysis, this attractor can be an experience, for instance, of pain or safety or whatever else. For self psychologists, they can be understood as self-states that are organized by a particular experience with the

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selfobject. In psychoanalytic treatment, this internal experience of the selfobject gradually becomes part of the transference to the analyst. The self-state that accompanies each particular selfobject experience might be introspectively observed and reported for some patients, but for many more of our patients, where intense anxiety accompanies the particular selfobject experience, that self-state is split off and observed in transference enactments. Complex systems are open, that is, they are always impacted by multiple forces from outside, from its context. Complex systems are also
unstable. not like the eggbeater that moves the batter in a predictable pattern. For Edelman, the brain is a complex system that is open to all kinds of influences from the rest of the body and the physical and social environment of the organism. The brain is also unstable, constantly shifting from one state to another in patterns of change that are not predictable from its initial state. These patterns of change, and things like what sets off shifts in these patterns, are the focus of investigation. Findings from this kind of study are useful for constructing a model for the functioning of dynamic systems. This model not can be used only to understand more about the brain, but also to understand more about other processes of change. Esther Thelen, a developmental psychologist, also uses this model to study behavior as in the development of movement, for example, walking, reaching, and perceiving (Thelen and Smith, 1994). This dynamic systems model can also be used to study the process of change in psychoanalysis. The search for the rules of change would be the same as that search for Edelman and other biologists who study complex systems (including evolutionary biologists), and it will be the same kind of search that is made by such developmental psychologists as Thelen. The essential relevance of Edelman
to psychoanalysis is not what he can say about
correspondences between brain
function and the patient's experience; what is relevant is
his dynamic systems
model for change in the brain, because that model is also
applicable to under
standing change in the emotional functioning and experience
of the patient in
the psychoanalytic process.

Constructing a Model for Change in Psychoanalysis

We must acknowledge that not all change in our patients'
psychological function is enduring, nor is it necessarily produced by what
we believe we are
doing in psychoanalytic treatment. Edelman's dynamic
systems model helps
explain how there are many kinds of influences on
reorganization, including
behavioral conditioning and associational learning, and
pharmacologic and other
biochemical agents. Intervention one place in the system
will influence every
thing else in that system. Having accepted this notion, a
psychoanalyst must
then go on to specify the unique features of psychoanalytic
treatment that differ
entiate it from other nonpsychoanalytic psychotherapeutic
interventions.

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Psychoanalytic Process Psychoanalysts agree that one of
these unique features is our goal to "expand
consciousness" and increase self-reflection. Techniques to
accomplish this rely on the analyst's empathic observation
and response to the patient's subjectivity. Serving as the
basis for therapeutic change, this must be tied to the
transference as the focus of treatment. "Transference" is
the psychoanalyst's way of seeing coherence and
organization in the patient’s subjective experience that accompanies repetitions in his behavior, affect, fantasy, memory, enactments, dreams, and here-and-now experiences with the analyst. Enduring change takes place in the context of the subjective experience of the transference. This notion of transference can be redescribed in the terms of Edelman’s mind/brain model as follows: Transference is created from memories and perceptual categories rooted in the patient’s past experiences, as well as from present-day interactions with the analyst and with other people and chance opportunities in the patient’s current life. However one thinks of the transference process at any given moment in the treatment, it serves to hold together and integrate the subjective experiences of the patient and the analyst. These subjective experiences are rooted in acquired values which carry the intense salience expressed in the patient’s recurrent patterns in the patient’s subjectivity. These acquired values result in systems of salience that direct the person’s strivings. These strivings are repetitively recognized and reorganized in the construction of a subjectively coherent transference narrative that includes retranscribing memories of the past (Modell, 1993). With conceptual recategorization made possible by the reworking of memories and the articulations of transference experiences, the “patterns of acquired values and related strivings will gradually change. This will result in the patient’s reorganization. Meaningful behavior, articulation in language or semiotically based communication, as well as fantasy, are important for the psychoanalyst. All are “actions” in the sense of being expressions of the person’s mind/brain organization. Many have claimed that the patient’s experience in treatment of that patient’s own actions and mutual enactments with the therapist is curative. Although for some patients this is most certainly true, this type of therapeutic action is not unique to psychoanalysis. However, the unique feature of transference-based psychoanalytic treatment is the verbally or other semiotic but non verbally communicated narrative that emerges from the back-and-forth of the patient’s reported experiences and “actions” in the analytic setting, for example, enactments and fantasies, in interaction with the “context,” and the analyst who offers empathic recognition by her responses and interpretations. When the narrative is organized, communicated, and thus recognized by the analyst, self-reflective consciousness is expanded, and the acquired values (including unconscious motives) can be revised. This gives the patient an opportunity for reorganizing and changing in a more thoroughgoing way than
patients in other forms of psychotherapy. Salience, or acquired values, gives direction to the transference experience. The intense shared experiences and self-reflection during the construction of a transference narrative results in reverberations on many levels of the mind/brain. Edelman’s ideas about consciousness in a dynamic systems model of mind/brain are pertinent for questions psychoanalysts debate in discussing therapeutic change. Why does change take so long? Why is repetition so prominent a feature? Why are enactments as expressions of meaning important in the treatment process? Why is verbalized interpretation about meanings and commentary and labeling of categories so important? Why is transference central? Edelman views consciousness as the spontaneous result of human mind/brain self-organizing activity that happens in interaction with its environmental context. For the purposes of our discussion here about psychoanalytic treatment, this context is the analyst as selfobject. Edelman makes a distinction between primary consciousness and higher order consciousness. Primary consciousness is "awareness," which is made possible through two evolved capacities of the brain: the capacity for perceptual categorization of experience and interaction with the world and memory. Higher order consciousness is awareness of aware
ness, or self-reflection, made possible by the evolutionary capacity for symbolic

and other related nonsymbolic redescriptions of states of awareness (or primary consciousness). Always it requires some kind of shared semiotic or semantic system, usually involving the use of language, which makes possible the socially communicable discourse with self and other or within the self that is essential for the internal dialogue of a self-reflective process. I There can be many varieties of states in primary (awareness) or higher order consciousness (self-reflective awareness), which altogether comprise the Jamesian "flow" that is our experience. As psychoanalysts with our patients, we are concerned with observing and interacting with this "flow" of primary and higher order conscious states, using it as a data base to infer split-off or unconscious states. Such states reflect the organization of selfhood, and are self-states. One of the objectives for psychoanalytic treatment is to increase or improve the patient's capacity and use of self-reflection, expanding higher order conscious ness to make these states the objects of self-reflection. As self-states, they rely on an "organizer" or, in dynamic systems lingo, an "attractor," which is a particular selfobject experience which occurs in treatment with the analyst. For the sake of exploring and extending the usefulness of Edelman's ideas.
about consciousness, we can begin by describing familiar psychoanalytic ideas in the terms of his mind/brain model. We can agree with Edelman that (1989, p. 194), generally speaking, "mental diseases" are disturbances in intentionality. The currently popular distinction between procedural and semiotic memory, used to distinguish between levels of experience and functioning in treatment, is not parallel to the distinction made here between primary and higher order consciousness. Procedural memory can become the object of self-reflection of higher order consciousness, just as semiotic memory might not be such an object.

Breaks in Consciousness in the Psychoanalytic Process and that they are manifest in states where an original intention or some affect about that intention, that is, a longing, is unconscious and barred from awareness. Another different category of unconscious processes or contents are those that have never been in awareness, such as the structures and organization of the mind itself. Psychoanalysis is the study and treatment of dissociation, or the first of the just-mentioned types of unconscious processes, variously designated as repression, disavowal, denial, and myriad forms of splitting. Dissociation can be thought of as breaks in consciousness that happen when conscious knowledge is repudiated or for some other reason becomes inaccessible to awareness. The term "breaks in consciousness" emphasizes that higher order consciousness is a given in human experience, and explanation is demanded not so much for its existence but for the breaking of its flow in regard to adaptive and flexible attention. With our patients we are nearly always concerned with disturbances in higher order consciousness, or self-reflective awareness. Edelman proposes that the functioning of higher order consciousness rests on three biological evolutionary brain capacities which are the underpinnings of the spontaneous emergence of consciousness in mankind. In addition to the two brain capacities essential for primary consciousness, the categorizing of percepts and concepts and memory, there is another essential capacity, to construct a socially communicable narrative. This narrative may be expressed in
a semiotic or semantic terms, but in psychoanalysis it is often verbal language. Each of these capacities are different but coexisting and interrelated levels of organization, correspondent to levels within the neural network. Opportunities for functional change or for new paths and loops of reentry are opened up as increasing interactions among the other levels become possible with the expanding and increased conceptual integration of higher order consciousness. States of consciousness in the mind vary with dysfunction in any of these three kinds of brain capacities or because of failure in reentry. Failures or distortions in perceptual categorization are rare in psychotherapy patients, and are more often the source of problems for the neurologically impaired. However, dysfunction of concept categorization and of memory recategorization are common sources for problems with our patients, and have been described in this way by Modell (1990, 1993). Another common source of problems for our patients is failure in the socially communicable articulation of experience that supports and is correspondent to the reentry pathways that make recategorization and integration possible. In Edelman's model, dysfunction in any of these three capacities blocks change in disorders of higher order consciousness. The mind is less plastic and resilient when reentry is selectively blocked. 2 1 Edelman's concept of reentry, seemingly so mysterious, is actually another name for the notion in dynamic systems theory that what happens one place in a functioning system will reverberate and effect change in other places as well.

BARBARA FAJARDO 35 Psychoanalytic treatment promotes reentry and therapeutic change, expanding higher order consciousness by communication about and offering repeated opportunities for alternative more adaptive interactions with the nonself environment. These interactions, repeated almost endlessly in different contexts and times, gradually strengthen new pathways in the neural network organization. Neural connections that allow new concept categorization, memory recategorization, and a greater capacity to construct a
socially shared narrative

of experience are strengthened. Just as the physical environment's contingent response to the organism's biological activity is important for reentry and adaptive reorganization, the analyst's affirming recognition and contingent response to the patient's intentions within self-states is essential for change. In the transference, in the repetition of old dysfunctional patterns, the patient's experience of the analyst's recognition or disappointment in her failures to respond will set off dissociations, or breaks in consciousness. Failure by important other people in the patient's past has led to dysfunctional patterns in self-state shifts that are responsible for present-day breaks in higher order self-reflective consciousness. These dysfunctional patterns are changed when two conditions are met: First, there must be opportunity for repeated intensely experienced and action-based interactions with an environment. The second condition is the construction of a communicated narrative of present experience that includes a concept of the past. The patient's experience with the analyst in the transference meets both these conditions necessary for change. "Breaks in consciousness" are disruptions in the flow of normal adaptive awareness. Defined in phenomenal terms, the patient feels anxious, or the pa
tient might feel no anxiety when realistically anxiety should be expected. Often there is a sense of unreality or depersonalization. There is a shift in self-state, and correspondingly for the analyst, there can be a countertransference experience of sleepiness, distraction, nausea, boredom, anxiety, or agitation. Defined in psychoanalytic dynamic or self psychology terms, breaks in consciousness are a disavowal of longings for a selfobject experience, in connection with the analyst, experiencing them instead in a split-off context redirected toward a different object. This is a type of splitting, or dissociation, where strivings in subjective awareness that are unacceptable are reassigned to an alternate self-state where the intentions or affects originally associated with the strivings cannot be reflected on or be conscious. In the alternative split-off self-state, the selfobject experience with the analyst in the transference is the "organizer" or "attractor" that stabilizes that organization for the patient. When unacceptable intentions or affects are experienced and expressed symbolically in another way, they are split off, most commonly as behaviorally in meaningful enactments where the objectives and affective tension associated with the longings can be disguised, for instance, by being sexualized. These intentions cannot be the object of self
reflection, and hence are not communicable in narratives with the analyst. Kohut’s Breaks in Consciousness in the Psychoanalytic Process (1971) has described this phenomenon as a vertical split. This has been further elaborated by Goldberg (1995) as the underlying dynamic for narcissistic behavior disorders and the subcategory of perversions. In behavior disorders the longings are expressed only in action and not in articulated higher order conscious states, and hence are not available for self-reflection. Described in dynamic systems terms compatible with Edelman’s model, breaks in consciousness are discontinuities resulting from shifts between two states. These two states-A and B-are related because they are each part of an overarching state AB that the patient cannot experience as integrated. States A and B exist as parallel and simultaneous possibilities for conscious experience, but in the patient’s awareness, they are successively conscious. In state A there is explicit knowledge which is articulated as meaningful in self-reflective consciousness. In state B this knowledge is disavowed, implicit, and nonreflective, and is expressed in performative action. However, in state B there may be other explicit knowledge that is conscious, which in state A is only implicit and expressed performatively. In either states A or B, whatever knowledge is implicit is enacted as behavior or reflected in symptoms that have unconscious meaning. The shifts between states A and B are initiated by experiences with another person or events and circumstances that are nonobvious and seemingly unimportant to the patient, such as the lack of a longed-for response from the analyst or other important person. Because intention and affect in either state is not articulated semantically, the states are not integrated and cannot be reflected on as meaningful in higher order consciousness. In Edelman’s model, the inability to articulate the meaning prevents the use or emergence of reentrant loops in the neural network, and precludes their integration. This reentrant loop blockage, for Edelman a biological condition, underlies the inability of the person to be aware and self-reflective about all aspects of the self-state. Because there are multiple controls of human thought and action, this blockage theoretically might be changed either by psychological or biological interventions. Practically speaking, however, most therapeutic change in disorders of dissociation is brought about through interventions possible in psychotherapeutic intervention. For most of our psychotherapy patients, the inability to articulate and be conscious of self-states is learned. It can be learned from noncontingent or
nonaffirming responsiveness, including dissociation and censorship originally fantasized or learned in interaction with parents. It can also be repetitively elaborated in current experiences with a therapist who does not recognize and respond to the patient's self-states. Failures in consciousness can also be due to limitations in linguistic facility and concept formation. For instance, a patient, who may never have had the opportunity to talk to anyone before about a particular striving or longing, may have no expectation that it can be shared and acknowledged.

BARBARA FAJARDO 37 I now describe the treatment of a patient, Regina, who was in treatment eight years once or twice weekly. In this account I illustrate how breaks in consciousness can be seen as shifts between two self-states that are unconsciously simultaneous but consciously experienced successively, in alternation. The integration of these two self-states was supported by transference repetition, enactment, and verbal interpretation of the transference. Describing the process in terms of shifts between two self-states is based on my subjective observation as the therapist who was part of the process. This is a first step toward devising a natural science method of observation, where self-states can be clearly defined, and the process can be ultimately made available to more than one observer to establish inter-rater reliability of these subjective clinical judgments. Regina

When we began the psychotherapy, Regina was 25 and just beginning her career in advertising. She was tall, lean, intelligent, and strikingly attractive. In tem
perament and appearance, she reminded me of a beautiful and carefully bred

high-strung racehorse. Although her new job was well within her capacities and

training, she was anxious her performance might not meet the stringent stan
dards she expected. She was lonely and bitter. She wanted to find a man, but had

never been successful with anyone beyond the first few dates. She had no close

women friends, and found it difficult to trust anybody of either sex. She had

tried therapy recently with a male psychiatrist resident-in-training, but quit after

several months because she found him superficial and insensitive. She thought

maybe a woman would work better for her, but she was skeptical. I was inter

ested in her and found her appealing in her intelligence and determination to get

the right help. But I felt uneasy with her at many moments, and knew she was

difficult and one of those angry people who are never satisfied. She would bite

the hand that feeds her. She is the younger of two daughters in a well-to-do family. Her mother was a

chronically angry self-centered woman who felt she never got enough of any

thing she wanted, including clothes, attention, and condominiums in warm cli

mates. She struggles with a weight problem and is envious of Regina's slender

beauty and accomplishments. As a child, Regina was the daughter who was most
attentive and compliant with the responsibility for mother's well-being. Now, as a young adult Regina complained of feeling hurt and angry about mother's oblivion regarding her needs for support and acknowledgment. As a child, she never believed things could be otherwise and accepted her role as mother's emotional caretaker. Recently, in spite of having the financial wherewithal, Mother had interfered with passive Father's willingness to pay for graduate school, declaring that Regina was old enough to pay her own way. Recently, in spite of having the financial wherewithal, Mother had interfered with passive Father's willingness to pay for graduate school, declaring that Regina was old enough to pay her own way. Now graduated, Regina 38 Breaks in Consciousness in the Psychoanalytic Process had a large school loan to repay. This apparently needless deprivation was an experience that seemed typical and was familiar to Regina from her childhood. This old familiar experience was part of the beginning transference configuration with me: even though she wore elegant designer clothes, she insisted she was entitled to a reduced fee for the therapy because her income was being depleted by repaying this loan. Her demand for my special consideration was related to the hurt and anger about her parents' denial of her entitlement for help. Angrily she asserted her needs, trying to wring satisfaction of her needs and longings from every pillar and post, including from her therapist. Her wishes and expectations were acknowledged, but their fulfillment had always been denied. Over the eight years of the treatment, Regina and I usually met twice a week. Most of our time was taken up with the same two manifest issues she identified as problems when we began the treatment. First, she suffered great terror that she was not doing well at work, even though it was clear to me and apparently to everyone else at her job that she was working hard and performing with excellence. She was afraid others envied or hated her, that she would be isolated, ignored, and eventually fired. Second, she was anguished that she was not finding a man who could take care of her and with whom she could settle down. In the early years, she would scream at me that I was not doing my job because she was not finding this Mr. Right. She complained as if her dilemma was my fault, that to make matters worse, she was
not exactly well supplied with compatible women friends, either. Over time I came to understand that these emotional maelstroms would abate if I held onto my hat and stayed calm. I struggled with countertransference feelings that she was insatiable and tiresome, and in the worst of it, I dreaded our sessions. I recognized her neediness and fear of revealing it: saying as much to her, I would then offer an extra session that week, reassuring her of my concern and interest in her distress. In addition, sometimes I suggested that she needed what we together called "soul medicine," which would be something she enjoyed like reading poetry and working out at the gym. With these interventions, her frenzy would diminish. If I could identify her longing for my appreciation and acknowledgment, and recognize her entitlement to a reasonable fulfillment both with me and with others in her life, she would recover from her agitation and depression. This would also involve exploring her fantasies about why, in spite of being entitled, she believed there was no satisfaction for her. Regina was prescribed Wellbutrin for the last six years of her treatment. In the last year, she also was prescribed Serazone for anxiety states. The introduction of pharmacologic intervention pacified her, soothing her agitation when she couldn't immediately get exactly what she wanted. She felt this provided a safety net, breaking her emotional fall into disorganizing rageful and depressed states that interfered with her feeling connected with me and others in her life and making use of the opportunities in her treatment.

BARBARA FAJARDO 39 During the first three or four years of the treatment, it was difficult for Regina to accept my being important to her. She was reluctant to need much from me, although she secretly idealized me and thought I could support her and tell her what to do about getting her needs satisfied. This attitude was state A, one of the two oscillating self-states. She soon started meeting men, and for periods of several months, she might have a boyfriend. As the romance began, the alternate state B had its onset. In this state, the man was idealized as I had been, and she
had hopes that he would fulfill her and make her feel worthwhile. She thought
this fulfillment would be in being reassured that she was sexually attractive and
worthy of his generosity. She became excited about the man and thrilled with
herself as an attractive interesting woman. At the height of her involvement in
each relationship, she believed that any connection to me was expendable, and
feeling satisfaction from her new man she stopped railing at me for my inadequacies. She imagined quitting her therapy, because with this man she felt she
had everything. Several times she briefly stopped treatment. Soon disappointment with the boyfriend would set in. The man seemed distant, unavailable, and now seemed to have little in common with her. I became
more important to her again. Although I was idealized, I was quickly found to be
inadequately responsive. This was state A again. The shift to state A was driven
by her disappointment in the man in state B. She gradually had realized the man
could not make her feel important and fulfilled. For instance, one man contin
ued an active involvement with his ex-wife; another was charming but addicted
to marijuana. Still another was a liar and lived in another country, only meeting
her for long weekends in exotic places far away from either of their homes.
Some of these men were significantly older, with whom she could feel excited about her capacity to be sexually arousing, although her own sexual pleasure was limited. These men constituted a series, but she was unable to reflect on how similar they were and the obvious signs of future consequences of her choices with them. In this self-state (B), the idealized man turned out to be no good; with the shift to state A, I could then be idealized as potentially fulfilling. However, I turned out to be no good because I could not quickly and magically get her the man who would be fulfilling. As we cycled through these two alternative states, during our work together she became more realistic about what I could give her and she could feel more fulfilled by my responses to her, even though of course they fell short of my finding a man for her. This was the beginning of a more stable integrated state AB that supported greater self-reflection and expanded consciousness. The most important point for the discussion here is her cycling from state A to state B that eventually resulted in greater awareness about her transference relationship with me. Each state was characterized by disavowal of some different aspects of her experience that were apparent to me and could also be seen by other empathic observers. One area of disavowal was her idealizing of me; the
other area of disavowal concerned what would satisfy. For instance, in state B

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she disavowed her idealization of me, dismissing me as unimportant. I was re

placed in her esteem by another person, an idealized man. In further disavowal,

she gave up any interest in my recognition of her "soul" (e.g., her reading and

writing poetry), and replaced it with the goal of having a man who could re

spond sexually and otherwise be generous with his money and time. This re

sponse from the idealized man, in state B, made her feel thrilled and excited

about herself. This man's excited appreciation of her as a sex kitten was keenly

felt, at the same time as she felt little satisfaction with me in her treatment. Foil

owing painful disappointment by the man (state B) she shifted back again to

state A, where she idealized me and wanted recognition for artistic expressions

of her "soul." She would begin making imperious and urgent claims for my

recognition and generosity. Gradually discovering my shortcomings, she again

would be angrily disappointed to see that the person she had turned to fell short. Aspects of each state were enacted, and only toward the end of treatment

could she be fully conscious and hence self-reflective about these experiences

in her selfobject experience with me, as transference. What
had been missing in
her awareness early on was the feeling of fulfillment
(pleasure/aim), and the

person from whom she desired the fulfillment (me) was
replaced by another (a

man) (object). Also, the nature of the fulfillment was
sexualized (source), where

a sexual response replaced a response to her "soul." In
state A the disappoint

ment was enacted with me being seen as devalued. In
reaction to that disap

pointment, there was a shift to state B where the
fulfillment was revised to be

sexualized and enacted with another person. Satisfaction
was in the man's re

sponse to her as a sex kitten. In state B, the trigger to
return to state A was the
disappointment enacted with the man who was the idealized
replacement for

me. When she began treatment, she could not reflect on
these states as meaning

ful and as a context for disappointment; she could only see
them as directives

for action, which led to shifting the enactment into the
configuration of the al

ternative state. Gradually this changed, and with
seemingly endless repetitions of these state

shifts and with my repetitively identifying the disavowed
component of experi

ence in each state and the disappointed strivings that
stimulated the shifts, she

became more self-reflective. The transference (state AB),
where she was con
scious of a satisfying relationship with me, expanded and was more stable and less disrupted by the disappointment with me. In effect, the two previously separate self-states became integrated into one more stable state held together by the transference experience. Over the last few years of treatment, she was able to be more contented without a boyfriend in her life, and learned to be more comfortable alone. She eventually found an ordinarily flawed man who appreciated her intensity, intelligence, and vulnerability. He was often but not always warm and sensitively responsive.

Regina was able to accept his occasional distancing and self-preoccupation and

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could weather the long period of his ambivalence and uncertainty about a long term commitment before he finally proposed marriage. This improvement moved in step with her acceptance of her need for me, which soon let her terminate with ordinary sadness and a more realistic assessment of her needs and entitlement.

My experience with this patient and others like her is that therapeutic improvement requires a lengthy period of time, as attention is focused on the cycle of states and the transference enactment of her needs, their disavowal, and the fantasies about their being fulfilled and disappointed. At the risk of resting my conclusions on too scanty a taste of Regina's treat
ment and improvement, I summarize the most essential three ingredients of this recipe for success:

1. Seemingly infinite repetitions of the maladaptive or pathologic conscious states and the breaks or shifts between them are required for the therapeutic process. Eight years of this repetition can seem like a long time.

2. Actions and enactments, and their subjective salient meanings, are accepted and investigated in the treatment. This includes the analyst being an active respondent, a role that is carefully explored and delineated with the patient, thus becoming the patient's partner in the therapeutic process.

3. A transference narrative is constructed which includes labeled and shared communicated description of the two states and whatever events or fantasies mark the breaks in their continuity and moments of their shifting. This transference narrative eventually integrates and explains the two states and the shifts between them. This narrative must also include a story of the patient's past and an expectation of her future that is also relevant for understanding the present conscious states and their breaks.

All psychoanalysts know about these ingredients; Edelman's mind/brain model suggests why they are necessary for therapeutic change.

Replication of Maladaptive State Patterns

Some psychoanalysts believe that the patient's initiative to repeat painful and maladaptive states is resistance, motivated to hinder change. This is sometimes understood to be an expression of the death instinct, or a "negative therapeutic reaction." However, when we are accepting and can work empathically with our patient's experience-near repetitive states, we can aid a reorganization of these
states. This has been demonstrated in the account of Regina's treatment. It rep
resents an approach to clinical observation and technique recommended by Kohut,
and elaborated further by others. According to Edelman's dynamic systems model,
action, including repetition of experienced interactions with the social and ob
ject environment, is the basis of learning and an important guiding force in the
organization of the neural networks of the brain. Action affects the biological
foundation of the mind. This idea is a restatement of the association learning
paradigm that is a part of modern psychology's foundation. In Edelman's model, Regina is like many patients who come to us for help:
her neural network was organized in conjunction with maladaptive behavior and breaks in the flow of conscious states. The already-formed organization of connections in the brain cannot be erased, nor can they be made irrelevant or supervened by the advent of a higher developmental order of some kind. The reorganization requires making new connections through a reentry process, based on repeated new experiences that are simultaneous with the possibility for the old pathologic experience, until the new pathways of interaction become stronger.

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That mind, consciousness, human experience, and subjectivity emerge out of the developing and organizing neurobiological matrix has become the shared focus of neurologists, neurobiologists, and psychoanalysts in the recent decade (Edelman, 1992; Levin, 1991, 1997). Interdisciplinary work on neural development and anatomic localizations have given credence and vigor to psychoanalytic developmental models; the unquestionable facts that we live in our bodies and that our sense of self is rooted in a period well before language begins have been further deepened and enriched by recent research exploring the interplay of mind and brain. That brain plasticity is constant until death, that brain cells are not, as we were taught, given in fixed numbers like eggs in the ovary at birth, that brain cells are altered by their physiologic environment (why identical twins are never identical) is exciting news indeed. These emerging neuropsychological concepts and explanations root psychoanalysis in modern neuroscience and enhance its legitimacy as a technique for personality transformation. All experience alters brain function. For example, Position Emission Tomography (PET) scans reveal different areas of the brain activated by focused episodic memory—the kind of recall of detailed past
experience that is used in
taking and by random episodic memory-the
uncensored, spontaneous
tinking that occurs in psychoanalytic work (Andreasen et
al., 1995). PET scans
done after successful psychotherapy, cognitive and
behavioral, for obsessive
compulsive disorder look the same way as scans done after
beneficial use of
antidepressant medications (fluoxetine), and both kinds of
treatment, talk and
meds, produce diminished cerebral metabolic rates for
glucose in the caudate
nucleus (Baxter et al., 1992; Schwartz et al., 1996). A
recent report compared
serotonin levels using complex brain imaging techniques in
two matched young
men with personality disorders and depression. Both men had
very low levels. 47 48 A Case Study of an Autistic Child
After a year of dynamic psychotherapy one man had normal
serotonin uptake. The untreated control remained at the
original low level (Viinamaki et al., 1998). We know from
all this only that two kinds of input, talk and meds,
change cellular function. We do not know from this how the
caudate nucleus relates to obsessive-compulsive symptoms
or that a diminished serotonin level is the root cause of
depression. On the other hand, it is important to remember
that although mind and brain interact they never quite
explain each other and that although the epigenetic models
of psychoanalytic development correlate with those of
neurological development, from that correlation we can
never infer causation. One can locate the body self
origins in the cerebellum, emotional tone in the amygdala,
and memory integration in the hippocampus; but with
increasing complexity, systems and functions develop that
cannot be explained neurophysiologically in a way that
captures personal meanings, their elaborate structures, and
the stamp of uniqueness. The phenomenon of consciousness
has its own logic and explanations and meanings appropriate
to it. It is a nonreducible phenomenon, a functional
property of the interacting whole, although it can be
destroyed in a moment with a scalpel. We will always deal with the limitations of homologies and the seductiveness of simultaneities. Reductionism is always lurking around the corner. Purpose and mechanism are different; correspondence and causation are different. Mind and brain interact, intersect, even create each other, but they never can fully explain each other. Things happening in parallel are not necessarily homologous, and one need not be the cause of the other. These are a few of the constraints on our wish for magical solutions to impossible questions. Yet the increased understanding of the complex interaction of mind and brain makes psychoanalysis extraordinarily more plausible as a technique for change and development. In thinking about the imponderable questions of the interaction of mind and brain in early development, and the emergence of consciousness and the roots of self-experience, I have reconsidered my own conceptualization of a treatment case that was significant in my development as a psychoanalyst. I wrote about it many years ago (Fisher, 1975) and presented in that essay some speculations as to how and why this autistic child developed. Those notions still hold, I think, but I now have some additional hypotheses and explanatory ideas that have grown out of my increasing appreciation of the potential impact of the analyst on the biological matrix at the earliest levels of personality development. I began my speculations about the case by thinking about the transitional object, that object described by Winnicott (1951) as both internally created and objectively perceived, alive in the developing child’s inner world, simultaneously part of the inner fantasy space controlled by the child, and a piece of “external reality,” its character defined by and shared with others in an “out there” space. Used as a bridge from one reality to the other, changing its character in each, being a part of an unchallenged transitional border territory, the transitional ob

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ject functions in the developmental phase of separation from maternal environ
ment and also as part of the lifelong task of separating internal from external realities. Essential to its function is that the transitional object reflects a neutral and unchallenged area of experience. I then argued that
in ordinary, adequate development there gradually differ
entiates out of the initial reality matrix of
mother-himself an awareness of an
"out there" subsystem of neutral, shared elements which the
child can operate in
and upon. The interactions with the "out there" are
fundamental to the establish
ment of the child's own personal reality. The later
transitional stage, appreciated
by Winnicott (1951), reflects the child's individual
attempt to integrate and tol
erate the separate existence of others with different
personal realities. When we speak of the capacity for
meaningful transitional object usage, how
ever, we are assuming the child has already experienced
some engaged interac
tion with aspects of external reality. For there to be a
transition between the unit
of world-mother-self to the world of experienced, separated
objects, to the world
of "not-always controllable" persons or things beyond
self-created imagery, we
assume there has been established as a base some playful,
masterful, self
generated interchange and experience of objects in "public
spaces," giving the
child an engaged acceptance of "that other country" beyond
the inner fantasy
life to which the child can travel and from which he can
return. That this awareness of an explorables world of
things and people can be unde
veloped or extinguished was observable in my work with this
autistic child. I
attempted to help this patient find a field for him to
operate in and upon. This

was not a transitional field between inner fantasy and outer reality, because there

was, as yet, no outer reality to which he related with aliveness. A field was needed

that could become the first outer reality in which he engaged with personal in

terest, without compliance to another. I attempted to create such a field with

him. Much work went into making initial contact with this boy. After that, still

further work was needed to develop a bridge from what he experienced as the

inseparable unit of him-myself to a "territory" as yet unexplored by him and

inconceivable to him. I believed that out of such an exploration he might "cre

ate" his own awareness of external things. Before there could be transitional

objects and spaces, reflecting an emerging tolerance of separation, there had to

be an acknowledged, interesting, masterable, relevant outside world. This field evolved around a Coca-Cola machine. And as that field was firmly

established through his complex, paradoxical use of the machine and extended

beyond it to an ever-widening personal world of humans and objects, the mean

ing of the machine to him and its place in his evolving person gradually shifted

to the forms of a true transitional object. At age six, Billy was unwilling or unable to use language. He had been vari

ously diagnosed before I met him as atypical, psychotic,
autistic, brain-damaged,

retarded, with visual-motor and perceptual disabilities,
poor motor coordination,

and poor attentional capacities. When I first observed him,
he made animal noises, 50 A Case Study of an Autistic
Child grunting, squealing, throwing toys, running back and
forth in and out of rooms, gesticulating, barking like a
dog, groaning, contorting his body, rolling his eyes to
the top of their sockets when someone approached him,
unresponsive to voice contact, recoiling at imminent
physical contact, and becoming limp and falling to the
floor when touched. He was fascinated by the rotary action
of merry-go-rounds and fans, turned light switches off and
on, watched record players turn, listened to music, and
was unwilling to let anyone read to him. He was thin,
pale, large-eyed, always frowning; when quiet, he would lie
in a fetal position. He was concerned about eyes, poking
at eyes of others; he would scream in terror and agitation
in the presence of balloons or a plastic Boppo. His only
comprehensible sounds, over and over, in high-pitched
singsong rhythms, were, "Will it pop?" Without any direct
acknowledgment or interaction with his peers, he had an
uncanny ability to provoke savage attacks upon himself. I
Confounding the diagnoses of organicity were his abilities
to use climbing equipment and to kick well. All clumsiness
abated when he thought himself unobserved. Complex
neurological and psychological testing, the best available
at that time, varied from "total incapacity" to "near age
level," depending on examination conditions, the
personality of the examiner, and the level of his distress.
Perceptual distortions lingered but were mastered in the
classroom during the next three years. I dealt with this
range of diagnoses and predictions by assuming he had some
kind of neurological lag and a variety of nonspecific
constitutional vulnerabilities that I could not allow to
predetermine my expectations of the treatment and
condition my thinking about him. I was impressed at the
time with the amount of sadism this boy evoked in everyone
who met him, including myself, and the amount of mockery
and skepticism I elicited for taking on this case. I
thought a great deal about the sadism problem. I disavowed
the criticisms of myself, which faded as he improved. The
mother, chronically tired, depressed, and pallid, seemed
unconcerned about the child, did not mind his lack of
speech and nonparticipation in family affairs, and
appeared for evaluation only at the urging of his nursery
school. Socially isolated and markedly unobservant, she
dwelled, much later, in her own treatment, on her intense
fears while pregnant with Billy, her anger at her husband and children, and her private conception of this boy as living out her own despair. During the months in which Billy became verbal, bringing home schoolwork, laughing and chattering gaily about his friends and activities at the therapeutic school, his mother was unconflictedly nostalgic for the mute, wordless bygone times. She preferred her daughter and felt uncomfortable interacting with male children. I Details of this case derive from my original essay. Permission has been given by the American Academy of Child and Adolescent Psychiatry to reproduce them in this volume.

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Such details of the patient's life as could be elicited came from his father, a biochemist, a tall man who spoke with difficulty, stumbling when anxious, in a flat, harsh, monotone. He made little eye contact, had an unvarying wooden expression, and a staff member observed that he held an infant sibling of the patient on his lap "like a block of wood."

The patient was the second of four children, the first son. His sister was five at the time of his difficult birth. All of the mother's pregnancies were disrupted by third trimester bleeding, necessitating bed rest, and two miscarriages had occurred before the patient was conceived. He was born two weeks late in the most painful of all the mother's deliveries, and from the beginning was not felt to be a cuddly baby. He was given less care by his mother than his elder sister and the later siblings, because she was again pregnant and fearful of another
spontaneous abortion. His mother was afraid to lift him, and between 8 and 11 months he was cared for primarily by a nursemaid to whom he was said to be attached. The nursemaid left the family when Billy was 11 months old, and he is described by the father as henceforth being unresponsive to separations from his mother or others. The quality of his care before the nurse arrived could not be ascertained, except that it was less attentive than that given to the other children; the parents, when interviewed, could not focus on his infancy in detail. In later treatment, the mother remembered having paid very little attention to him.

Billy was bottle-fed and experienced severe colic during the first two months; no feeding problems were reported. He crawled early, walked alone at fifteen months, and was toilet trained at three years in three weeks' time. He talked for a time at three and one-half years. His elder sister also began to speak late, but was fluent and verbal from three years on. Subsequent experience with the family established the inadequacy of parental perception and appraisal and a frequent distortion of fact and mood. For example, they reported that the boy had no sleeping difficulty, but later it was learned that the patient wandered through the night, coming into bed with his father at varying times during the night and...
in the morning, and that all the children randomly slept with the baby, getting in and out of his crib.

"pleasant": pleasant amiability characterized her conception of herself, her marriage, and particularly the relationships among family members.

The only acknowledged difficulty with Billy was discipline. The father matter of-factly reported that the child was beaten once or twice daily and locked in the basement in an attempt to control his temper outbursts. His mother also spanked him; neither parent felt their disciplinary methods to be noteworthy, and his father was able to cease the beatings only when it was pointed out that they had failed and when substitutes were suggested. The boy was not permitted to leave the backyard and play with other children because of parental conviction that he would be rejected by his peers.

The patient had been treated with Dexedrine and Ritalin, with no improvement. I discontinued all medication. Initially, I forced, carried, dragged the patient to my office. He behaved as earlier described and repeated, "Will it pop?" I answered, "No, it won't; I won't let it; we won't let it," or "I will fix it" in myriad repetition, a back and forth whose meaning transcended the formal content and was reminiscent of the "Ialling" behavior, the sheer pleasure in sounds, as the base of language symbolization (Langer, 1942; Weir, 1962; Vihman, 1996). Using blocks and inflatable toys, I invented "games" based on constructing, tumbling, falling down, inhaling, exhaling, and changing shape and contour. I assumed out loud that he would handle, tumble, break these materials. At first, I would do it alone, but gradually he joined me, and then I watched as he began to do the
pushing and pressing alone. I would help him reconstruct the original formation, and always I would be talking, using whatever from him or from myself could be a clue that seemed to reflect the transference-countertransference flow. Sometimes I talked to bring him sound, or simply to keep going, halting sessions only when the sadism and despair he frequently evoked might erupt in a form with which neither of us could deal. A team of teachers, counselors, and social workers met and struggled with similar fluctuations. Gradually over several months, I emerged as a being with whom he became openly preoccupied, and language-sounds appeared. These were very difficult to understand. They emerged concurrent with his concern with my body with touching and stroking, which had the same repetitive quality as the sounds he repeated. Sounds and gestures were always accepted by me; sometimes they were restrained, sometimes they were interpreted. At this time, there were no pronominal distinctions, no time distinctions, no ability to distinguish living flesh from pictures, or photographs from present spaces: a poster of San Francisco was as alive as the Washington, DC, in which we lived. No continuities existed in ideation or conception of himself or others. A change in my hair arrangement provoked panic that could be soothed only with time and repetition of interpretations of his struggles. Later when he could talk and issues of continuity of body contours and existence over time were less charged, he told me that when my hair was up, it contained all the cut-up pieces of his genitals, hidden there, and we agreed that he had been very brave to stay with me then. He seemed pleased that I had waited six months for him to tell me "that hard thing," different for him from many interpretations I made because it was something of "his," a new delight. Experience, I sensed, was a chaotic, agglomerated or fragmented, overstimulating mass of impingements upon him, or else a vast silence from which he and I seemed to evolve into his awareness as an undifferentiated unit. Over the next two years in which we worked together, we explored the outer environment, and he was more and more able to formulate the stuff of his inner world-fantasies, terrors, rages, jealousies, disappointments, and his cognitive struggles. He deve
developed the capacity to come alone to the sessions, began to discover "play,"

spoke clearly, read, developed much whimsy and humor, and made friends among
his peers. Four years later this patient was fully verbal, well coordinated, and his cognitive skills were developed to age level. He was attending public school, and engaged in relationships with peers, teachers, siblings, and fellow Cub Scouts appropriate to his 10 years. The therapeutic work around these phases of his development are not included in this discussion. I focused 25 years ago on one early aspect of Billy's elaborate treatment that of helping him to extend life beyond myself. Having made contact, having become a somewhat safe primary object for such a boy, I had to ask, what then? The world beyond me was fearsome to him, and he had little competence with which to explore it. What he had mastered had a mechanical quality that he seemed not to connect to himself at all. He moved like a robot, without spontaneity and laughter. That another person had entered his world sometimes seemed a presumption of the therapist, my ruthless conviction that he could and must grow up and must be able to feel and share any impulse in his being. He knew that he lived and failed in the world of six-year-old demands and achievements; what seemed to be blossoming in him was a network of feelings and signals related to the earliest of life's experiences—the beginnings of liveness and trust.
and human contact. But these beginnings, however vital for real growth and future individuation, could not bring him to the emotional and cognitive level of his most disturbed peers. This was a contrast he felt, and it had to be eased. As Billy became focused on my body, he began to acknowledge an interest in food around me. I noticed a particular delight he took when I brought him Coca Cola-holding the bottle, exploring its shape, and the mouthpiece. He would not at this time leave the office during sessions, and the moments of bringing and returning him to class at the therapeutic school belonged for him to a different order of time. I offered him as much Coke as he wanted and told him that there were limitless funds for Coke during the therapy hours, as much as he needed and wanted, and he could determine the quantity. I repeated that we would get the Coke together and that we would go through the hall together into the big lounge which was the meeting place for the psychiatric treatment center. It was important that we go because it was important that he have what he wanted and needed, and that he should get it himself. Billy demanded that these remarks be repeated over and over. He was most alarmed at leaving the office. Clumsy, he stumbled in the strange setting. He was deeply afraid to initiate any motion toward the bottles. (No aluminum cans then!) Day after day, hesitantly and
then with increasing

lust and vigor, he drank more and more Coke; he could have it only if he put the

money in himself, pulled the bottle out, and uncapped it. I would share all as

pects of the motions, his pleasure in the sounds he made, the slurping, spilling,

laughing. I was free with all responses about the procedure of getting and having 54 A Case Study of an Autistic Child the Coke, but the reaching out was his-and with this machine, he learned to use his hands; read; manipulate money, caps, bottle openers; coordinate multiple motions in sequence; and, under his own control, experience his physical needs, and put his own stamp on the chaos he had fled from. His face glowed with pleasure as he showed me his increasing skills, and stood before me, 8 or 10 Coke bottles held precariously. He would stand against the machine as if he were emerging out of it. He would scratch it, beat on it, touch it as he read from it, and lean against it or run back to it as he watched or talked to others and began to explore surfaces away from it. I observed and participated in the many fluctuating uses of the Coke machine. The machine seemed to be an outgrowth of the therapist into the world, an object that, though it was clearly an extension of me to him, could also become more than me. It was an object he could use in ways he could not use me because of his age and the conditions of treatment. His fantasy could flower within himself and extend beyond the literal limits of my body and his conception of my body into an increasingly accessible spatial field, and yet be simultaneously and safely expressed onto an object that was also me when he needed it to be. The machine was less than the therapist. It was neither of us, and so it provided an opportunity to understand what "neither of us" meant. It was to become a gateway into what for him was the "nothing" out there that existed beyond the edge of the developing unit of "him-myself." Gradually it became "his" Coke machine, the other "place" besides me, a "place" we went together, and his walk became more vigorous. Retrieving the Coke became much more than its obvious nursing function; it was simultaneously a bridge to motility and social contact, directed by him with pleasure and curiosity. Back in the office, having the Coke would sustain very trying explorations into newly conceivable areas of fear and memory. One day, after months of using the machine, we
found it empty when we arrived. The delicate structure he had created was shattered, and his face and body reflected the most profound distress. I explained. I could do nothing. Tomorrow there would be Coke. The Coke man would come tomorrow. No, I could not be absolutely certain, but I believed it. Let us find a substitute and let us somehow share this loss, this rage at the chocolate milk substitute the cook found to give us, this bewilderment at what I knew to be, for him, the first failure of my power, as well as the penetration into our lives of "another"—the powerful Coke man. At 8:30 the next morning, he watched the Coke man refill "his" machine. A field outside himself had been annihilated and restored. He said, "Yesterday the Coke was empty." He had never used a time referent before. He had only asked, "What is yesterday, when is tomorrow?" on many occasions. The sense of time that had, somehow, been developing in him was born then as something he used for communication.

SUSAN M. FISHER 55 The machine was, in some way, the live body of the therapist, to be explored;

but in this extended form, it was simultaneously an inanimate object like others.

As an inanimate object, it became a first step to the recognition and differentiation of other inanimate objects. Under these various aspects, the machine could involve him on the many levels of his awakening being. He began to explore other inanimate things—doors, switchboards, public monuments, light posts, stop signs—more and more assertively. My presence became less and less essential for his reaching out. Linus's blanket and the Teddy bear bridge a gap between mother and the world of external objects, a world the growing child has already explored while psychologically not yet fully differentiated from his mother. For this boy, the Coke machine was the link between mother and
the simultaneously
being-created world of things out there, an object and a
cosmic field in which he
could really first function and feel part of outer
reality. In daring to reach for Coke, Billy was daring to
take something from another,
to acknowledge the existence of things outside himself, to
value them. On an
other level, he was beginning to experience an infant's
sense of closeness/merger/
fusion, this time as joyful rather than terrifying and as
a state from which he
could emerge. These unrestrained ecstatic moments were part
of the larger expe
rience with his therapist. He learned there about
differences. "Do you like Coke?" he would ask me.
"Yes." "Do you love it?" "No." Very alarmed at that
implication, he went over
and over it, and, in time, he tolerated this hint of
differentiation. Gradually the Coke machine itself moved
from its function as the first exter
nal reality emanating from the therapist to a true
transitional object, as discussed
initially. As he developed friendships in school and
shared himself there and at
home, the Coke machine receded into the background of our
work. Its meaning
and usage became private to him. He drank Coke in other
settings and spoke of
constructing and reconstructing our realities from inner
private symbols and roots,
although we accept the common public definitions of
external reality. A para
doxical shift for this boy was that the Coke machine became
human, animate,

and relevant in the way that he and other humans had been
machinelike, wooden,

and mechanical; yet its inertness—its nonhuman
qualities permitted a range of

skills to be developed with aliveness, and struggles to be
played out on it. It

permitted discoveries of limits, time, differences,
sickness, greed, disappointments to be played out on an "it" that could then easily
extend to his peers,

which could extend indefinitely. As an extension of the
therapist, the machine became a surface he interacted

with, from which he could build a sense of the world that
he could live in with

out, at that moment, losing me. In this new world, the
ultimate loss of the therapist

had a place. It was a world where uncertainty could enter.
"Will I get sick?" "I

don't know" became tolerable to him. 56 A Case Study of
an Autistic Child For the chaos of his fragmented,
shattered world to coalesce, Billy needed an extension of
me to act as the anlage for the cosmos, so I could then try
to share with him whatever his experience required. Once
the machine had become for him an extension of the
therapist-himself-world, he needed an experience of
unlimited gratification, held within the boundaries of the
sessions, and, on other levels of his consciousness,
always directed toward the work of therapy. In optimal
development, external reality has liveliness and potential
satisfaction and challenge well before the struggle over
separation begins, and the transitional object can then be
used as the bridge between the self and others. For the
autistic child, of course, all this has yet to occur. In
some way the therapist must help make outer reality
relevant and personally connected to him, as well as
contribute to the growth of his viable self. If the
therapy succeeds, the child may then care enough and
function enough to build his personal bridge to the world
with his blanket or his Teddy or his Coke bottle. When
this process was sufficiently advanced, the live qualities of the ambiguously experienced machine came to be derived from a newly born fantasy life that was truly "within" because there was now a viable and reliable "without." The patient became very playful about the machine, and he treated it as a true transitional object-alive, not alive, the therapist, the world, whatever he wanted it to be. His conception of it lived within a potential space that existed between the boundary of himself and others, a space he could move within. As he became surer of that freedom, of the therapist's tolerance of that movement, he gave up the Coke. The capacity to play and the development of charming humor around this time seemed to be inseparable from the development of a boundary between himself and the world of others. This capacity reflected his growing experience that the existence of people and objects he could not control could be not merely tolerable, but personally managed. He was now capable of a reflexive interaction among self, others, and objects. This interaction could carry the variegated inner hues of feelings and private symbols and images into the experience of the inanimate world. World and self enriched each other. And in this interplay of world and self, he began to integrate the most profound paradox—that his own reality was different from those with whom he had once been fused, yet could be contained within a larger community.

As I look back on my thinking about this case, during the treatment and afterward, I remember as vividly as if it were yesterday my perplexity, my sense that I was participating in something that was in an inexplicable way working, a therapeutic collaboration whose efficacy was entirely unexpected to myself and to the variety of experts who at first scorned and then shifted their views of this case. It was important, actually, that the community of colleagues shift their attitudes because I attempted, with some success, to turn the entire hospital into a "designed for Billy" therapeutic milieu. I spent a good deal of time with the cooks, switchboard operators, elevator operators, and handymen explaining this...
tional peculiarities and maturational delays and that there were clear peculiari

ties of speech and thinking in the father and delayed language development in

al the siblings. The neurological diagnoses with which he came to the therapeu

tic school were considered sufficiently severe that therapy had been discour

aged: autism, retardation, psychosis, as well as a variety of dissociations be
tween eye and hand and mind and body. I did not want to be discouraged by the

convictions of experts that there was no hope for this child. I see his psychiatric diagnosis now as secondary autism with elective mutism

and a variety of constitutional deficits and developmental delays. With all the

unanswerable questions that remain in my mind, it is clearer now what I was

doing. I wrote my speculative essay 30 years ago about what I thought Billy was

doing, creating, constructing, with my help--what his emergent experience

seemed to me to be. I had no conceptual framework that satisfied me for what I

was doing beyond participating in and facilitating what seemed to be happening

in front of both of us, like a new road being carved out of a wilderness. If it was

working I would follow it. I had clear therapeutic principles and as much under

standing as anyone around me did in this peculiar situation, but I could only
later conceptualize it in terms of a hypothetical stage before transitional object usage could make sense, the establishing of a field for the later use of transitional objects as conventionally understood at that time. I saw that there was something remarkable happening around the Coke machine; I still think I was right about what it meant to him and what he was doing to and with it. But beneath the poetry and the phenomenology was harsh biology, and I had no conceptual framework to describe what I was doing at that level. What I think now—in addition to what I wrote beforehand—that I was organizing the chaotic experience of this chronically traumatized and neglected psychotic child arrested at the earliest level of psychobiologic emergence. I was functioning as a biological stabilizer, providing an organizing function for faulty neurological development and the missing compensatory help adequate early parental care might have provided. In retrospect it is clear that my intense preoccupation with him, geared as it was to his needs and manifestly cognitively driven as it seemed to me to be at the time, provided the kind of constancy of environment—I was the environment—that was required. It was as if I were the total container for all his needs, and the peculiar confluence of my life situation at that time made the provision of these functions possible without the depletion of myself.
that would have burdened his growth. I took him on as a research case, out of curiosity and out of outrage that he had been written off. I had sufficient self-reflective skills at the level in which I was moved by this boy to appreciate that working with him served many functions for myself in my development as a clinician. I was restless, bored, and irritated by the constraints of the nosology of the day. I had some small awareness at the time of the subtle and complex identifications that fueled my commitment to this child and my relentless determination to reach him. As I look back on this case, given this boy’s deficits and traumas, it seems now that in this earliest phase of the treatment my functions for this child were entirely prepsychological—that my activities and my presence were contributing to completing, altering, and shaping his neurological development, as if this traumatized child, because of his developmental deficits and the continual retraumatization and neglect, was like a preemie or a neonate for whom I functioned as a pacifying, calming, organizing total environment; that what was happening in this early phase of treatment corresponded to the earliest development, when we are so far from language, when mind is not yet emergent from body. I think now that this was virgin territory and that my sense that this was a research case was not far off the mark. I saw myself as the architect of a total therapeutic environment for this boy. In my most discouraged moments, I would think of Dr. Itard with the wild child of Aveyron, remembering how madly curious he had been; my grandiosity, however disciplined by altruism, was still operant. My preoccupation with Billy was calm and constant. I knew I must never promise what I could not deliver. It did not occur to me then that my presence, my involvement with him functioned at a biological level to stimulate what was latent, to integrate what was inchoate, and not only to create with him the beginnings of a self, which I did conceptualize at the time, but also to provide pieces of an undeveloped neurobiologic experience—that his developmental failure was so early that my reliable presence was somehow used by him the way the absent or delayed “healthy” biological environment would have been used. I was participating in a kind of rewiring of what was there or newly wiring what was close to the fundament, close to what should have been hard-wired had he not had
both specific constitutional vulnerabilities and parents (with perhaps the same or similar liabilities) who could not be the properly stimulating, responsive caretakers of the earliest psychological environment. Certainly there have been moments in work at archaic levels with either very ill or highly sophisticated patients in a functional regression where it has seemed that we were working at the edges of the earliest sensory-motor, prelinguistic, preoperational forms of experience, seeming to alter even their biology. But these were people who had developed the capacity to symbolize in some parts of their personalities and who had lives. This was all minimal or absent in this child. Yet from the concreteness of the block towers we built and the thousands of repetitions of "will it pop" there seemed to develop a range of capacities that had not been there before. His energetic capacity and driven willingness to repeat had the qualities of the earliest throwing out of multiple neurons which

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were then stabilized by my limitless repetitive responsiveness. His later mul
tiple forays to the Coke machine which was both myself and the newly forming

world had a quality of the shaping and carving of new functions that characterizes the early nervous system as it continuously overproduces and then prunes connections and "sculpts" the emergent brain. These are, of course, metaphors and analogies only, but the pattern of this child’s emergence into psychological life is remarkably like the shaping of the early nervous system. Were these new developments or old ones reclaimed and newly built upon?

Both, of course. There were signs of some capacity to symbolize and fantasize

in the variety of mumbo jumbo he began to utter, expressing some self-awareness

within each of his utterly nonintegrated states of being,
which suggest that he

must have, at moments, made it to Mode Two of Gedo and Goldberg’s hierarchi
cal model and then regressed back to Mode One (Gedo and Goldberg, 1973;
Gedo, 1979, 1988). After all, he had had some language at one time though it
had been "gone" for years. Did he really have language, lose it, and re-create it
all over again with me? Or did he have it, bury it, and rediscover it in the safety
of our work? I could not tell, and, when we discussed his lost language after he
became fluent, he could not remember. I think he grew to become able to describe his internal experience of the early

neglect and trauma in the six-year-old images of locating his vulnerable injured
genitalia in my tied-up hair. Had he put his developing body self bits into my
upswept hair for safekeeping because he could still not manage these newly

forming shadows of memory and fantasy? Who would ever know? Were these

entirely new ideas or old memories now safe to conceptualize, to share? My work with Billy poses a
dilemma. My essay describes in experience-near
terms what happened. How and why it happened-how and why structure devel
oped-is more difficult to explain. There are three reasons for this difficulty: First, there is the problem of the

observational perspective. Clinicians tend to view the therapeutic experience

from an observational platform of a two-person therapeutic
relationship, utilizing all the data of such experiences: his feelings, my feelings, ideas, fantasies, actions. Billy could in no way be his own informant for a very long time. No one had access, as a privileged observer inside his head, to note the processes by which isolated neurobiological and psychological elements coalesced into integrated, stable, patterned formations of structure and meaning. I was operating with a primal process that occurs well before language. Second, there is the isomorphism problem, which I hope Dr. McClintock will address. What may we infer, legitimately, from reliable observations about his behavior, as to what might have been happening at the various levels of intra-psychic and neurobiological development, particularly at their interface? Third, there is the time-dimension problem. Development requires time; it involves an ever-changing process. If my work initiated, facilitated, and integrated new developmental experiences and levels of new psychic structure for him, the salient processes inevitably had to evolve and alter in their dynamics and in the relationship of their component factors as his total personality was developing. Here the functions or role or relationship I played must have varied enormously over time. I was operating simultaneously at different time stages in nonlinear ways as if I were in a time machine. At different times I must have been a selfobject, a transitional object as well as part of a transitional object complex, a container, a libidinal object, a teacher. Above all, for a long while I was THE environment, and in that critical phase, I encouraged in my total acceptance of all activity and sound coming from him what neurobiologists call the overproduction of neurons,
which could then be selected by my conscious and unconscious reinforcement of what was, to me—with him—a functional human connection. We must have maintained the ones that worked, for him, for us. We shaped this together from what we uniquely brought to our encounters. At this level Billy and I were dealing with a biological deficit he shared with other members of his family, an inability, perhaps, to pattern, to shape, to organize the input of stimuli. He could never tell me what resonated or felt good. When I was the total environment, what we were doing was creating the psychological out of the neurobiological. I was the matrix, functioning at a level that was somehow equivalent to a cellular neurological environment from which structures emerged. Later we could talk. Before then we can only infer. Where was the creation of the psychological out of the biological? It had to be in the dynamical processing of our experience, the dynamic interplay, the back and forth, between us. As hydrogen and oxygen are known to be the essential elements producing water, that information cannot account for the quality of water: the wetness of water is a dimension of the interaction of the molecules that cannot be reduced to its components. A hundred years from now, if some psychoanalytic archaeologist happens to stumble upon this essay, that person would undoubtedly have a much more pertinent and complete range of theoretical ideas, with evidence to explain the how and why of Billy's drastic transformation. But in our present efforts to explain such structural change to assign sufficiency to any factor or anyone specific theoretical concept seems to me to be overly simplistic, grossly reductionistic, bordering on the ridiculous. All I know finally are three things: I stuck it out, against all the odds. I always felt myself to be a Good Object even when I was a nonobject in his experience. He changed structurally. So the case of Billy raises more questions now than 30 years ago when he raised so many questions. It is a measure of the distance our field has come that the explanatory metaphors we use to understand and communicate our work have deepened and now not only comprehend and attempt to encompass individualized, phenomenological, and psychological meanings, but also to reach down into the biological roots of human experience.


Baxter, L. R. Jr., Schwartz, J. M., Bergman, K. S., Szuba,


If we embrace the basic assumption that therapeutic talk changes the brain, an assumption that has received empirical support, the questions then become, Which aspects of the brain are changed? and What are the points of transduction between meaning-making and synaptic function? One strategy for addressing these daunting questions is to extend insights about development of sensory neural systems to the development and restructuring of the neural systems mediating attachment and social embeddedness. In addition, a reciprocal strategy is required. Our current knowledge of neural dynamic systems is insufficient to answer these questions about mind-brain relationships. It is also necessary to use therapeutic insights and successes, such as this case presented by Susan Fisher, to pinpoint the functional aspects of neural system change and development. This strategy is akin to Sherrington's (1948) exquisite understanding of the functional and dynamic properties of behavior that demonstrated that neural conduction was an insufficient mechanism for explaining behavior, and enabled him to postulate the functional properties of the as-yet undiscovered synapse. Fisher states modestly that there are three things of which she is certain: (1) the neural structure of her patient was changed; (2) she
was a constant in the interaction; and (3) the process took time. Let us use her insights to structure what is currently known about neural development that can elucidate how therapeutic talk might change the brain. Structural Change and Neural Development

Neural development can be divided into six phases or stages: neurogenesis, migration, differentiation, synaptogenesis, cell death (apoptosis when most cells are lost), and synapse rearrangement (loss and development within specific brain areas and neurotransmitter systems). What is the source of the specific neoanatomical structures that can represent experience? One key factor is the functional activity of sensory neurons. For example, the mouse has a brain representation of its whiskers that essentially maps the location of the whisker barrels. If the whiskers are removed during a critical phase of neural development, the synaptic connections, which had developed initially, are not maintained and are permanently lost. It is the function of the neurons driven by sensory input from moving whiskers to maintain the appropriate connections, letting the superfluous connections die, and creating the beautifully precise brain mapping of the location of sensory input. Likewise, in the visual system, its specificity and order depends on normal function of the brain, albeit not on sensory input. In the superior colliculus (SC), there is a "retinotopic map" of adjacent cells driven by receptor cells which are also adjacent in the retina. This spatial specificity develops in the rat before the eyes open and vision begins. In this system, the environment plays only a general role, maintaining development through glucose and oxygen which enable spontaneous activity before the eyes open-without visual stimulation. The specific environmental input is simply the fact that two receptors in the retina are next to each other. Two adjacent cells mutually affect each other and are more likely to fire together in space and time. Mutual stimulation leads to selective maintenance of projections to the SC from adjacent places in the retina. Spontaneous activity from retinal cells far apart do not mutually reinforce each other. In sum,
differences in neural structures are associated with past experience and differences in functional activity. Neural specificity is also likely in the development of attachment, and probably multiple sensory systems are involved to account for individual development. However, the neural substrates associated with specific behaviors and changes in behavior have not been identified. In the case presented, neural dysfunction at the stage of cell death may be pertinent to the expression of failed attachment. Obstructions of the natural process of cell death result in overproduction of neural material and inhibition of the synaptic rearrangements associated with neural development and change. Therapy may enable a recapitulation of the process of neural development which supercedes the failed attachment system. An Invariant Presence Fisher was certainly an invariant during multiple interactions and contexts over a long course of therapy, and it is likely that Fisher’s steadiness and "invariance" were important factors in the success of this treatment. It is striking that she first found an object for attachment that was more invariant than herself—a Coke machine. Like the invariant position of whiskers, or the invariant location of retinal cells, an invariant object may allow first overproduction of attempts at

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connecting—most would be inefficient and often inappropriate. Then the steadiness provided an opportunity for functional connections and ultimately change through pruning, the loss of dysfunctional connections. With Fisher, the child made a plethora of trips to that Coke machine, and had all kinds of interactions, some of which created a set of mutually reinforcing interactions at the neural level. A set of functional connections was maintained—the others were lost:

dropped out in time. When a plethora of neuronal connections are made, one has the substrate to work with. But that is not enough: a functional appropriate at
The attachment system may then come from discarding the nonfunctional connections, sculpting the attachment system. Fisher's steadiness allowed the child to move from a relationship with the invariant object of the Coke machine to a relation with the therapist, perhaps elaborating basic networks initially established through interactions with an object. Time and the Life Span

The timing of Fisher's treatment may also have accounted for the remarkable changes seen in this child. It occurred when he was between 6 and 10 years of age. This not only is an age when many neural structures are differentiating, but is also a critical stage in the expression of sexual attachment, when children begin to recognize romantic objects and experience sexual attraction. Both heterosexual and gay young adults recalled that they were about 10 years of age when they experienced their first remembered sexual attraction. There was also no gender difference in this age, suggesting that the hormones sculpting neural differentiation at this age are of adrenal rather than gonadal origin. Indeed levels of DHEA, an adrenal hormone that enhances attention and alters neuronal function, is rising steadily beginning at age six and reaching the low adult rate by 10 years of age. Thus the hormonal environment characteristic of this age
may have facilitated the development of a successful attachment system during therapy. Treatment earlier, or later, might have failed for lack of neuroendocrine


, See Giedd et al. (1999).

2 See McClintock and Herdt (1996). 66
Discussion-Psychoanalytic Talk and Neural Sculpting

I am most grateful for Dr. Gedo's inspiration and encouragement of my work throughout the thirty-odd years we have known one another and collaborated in several capacities. Indeed, this essay is an outgrowth of some thoughts that I jotted down upon reading The Languages of Psychoanalysis (Gedo, 1996). Dr. Gedo was kind enough to comment on these notes, and urged me to pursue this work. I believe that the theoretical framework that John Gedo has developed throughout the years fits best with updated information on the functioning brain. As I address the concept of the organization of overall functioning and identity which I regard as "self," I find as many definitions as I find psychoanalytic writers. Such reified words "tend to be imbued with a
power of their own, and
create pseudo-realities if one is not careful" (Basch, 1984, p. 37). The group of
so-called self psychologists, who use "self" as both noun and adjective, has failed
to relate the concept of self-functioning to underlying brain mechanisms, or to
address the maturational and developmental origins of this functional concept.
Indeed there has been a strong tendency to regard self-organization as a struc
ture (the "self") rather than as a flexible, dynamic function, dependent on the
orderly maturational sequence of neural mechanisms and the organization of, as
I see it, six motivational systems. Review of the Literature
Mahler, Pine, and Berman (1975) refer to a "process of self-definition," which
comes close to my notion of integrated motivational systems. Daniel Stem (1985)
devoted most of The Interpersonal World of the Infant to a psychological under
standing of the development of the infant's "sense of self" and "self with other"

experiences. He states: "A crucial term here is 'sense of,' as distinct from 'con6 68 The Self-Organization and the Autonomy System cept of' or 'knowledge of' or 'awareness of' a self or other. The emphasis is on the palpable experiential realities of substances, action, affect, and time. It is an experiential integration" (p. 71). In distinguishing this point of view, Stern (1985) states: In contrast to these more concrete and objective views, the present account has stressed the very early formation of sense of a core self and core other during the life period that other theories allot to prolonged self/other undifferentiation. Further, in the present view,
experiences of being with an other are seen as active acts of integration, rather than as passive failures of differentiation. If we conceive of being-with experiences as the result of an active integration of a distinct self with a distinct other, how can we conceive of the subjective social sense of being with an other? It is no longer a given, as it was in Mahler's undifferentiated "dual-unity" [po 101]. Stern goes on to describe his concept of RIGs, representations of interactions, generalized. These are lived experiences which are represented in memory as they are experienced repeatedly. This system emphasizes the crucial role of memory in the integration of the self-organization. He lists four requirements for an organized sense of a core self: self-agency, self-coherence, self-affectivity, and self-history. These requirements or functions, addressed in a different focus, are close to the neurophysiological components which we describe as the self-organization. Stern (1985) pronounces the "death-knell" on symbiosis thusly: "Primary fusion was a pathomorphic, retrospective, secondary conceptualization" (p. 105). Although not using neurophysiological data to support his concepts, Stern definitely began to use brain functions such as memory and affect to explain more complex psychological functions. The one major correction to his formulations of 1985 is to rule out "amodal" perception and replace it with the more recently identified polymodal representations in convergence areas of the brain. Several more recent authors' works come even closer to describing psychological phenomena that can be supported by the biological functions, regarded as the substrate of self, which we are now able to observe. The perfection of the PET (positron emission tomography) scan, with its capacity to visualize the living, functioning brain, has made possible gigantic leaps in our knowledge of the normal brain performing psychological functions (Chugani and Phelps, 1986). The authors who have come closest to a fit between biology and psychology are those who have kept the brain and its functions prominently in mind. The first author I consider is Joseph Lichtenberg, who made a major contribution to the understanding of motivation in Psychoanalysis and Motivation (Lichtenberg, 1989). He begins with a consideration of the concept of self which follows rather closely the format laid down by Stern (1985), with the same timetables of emergent, core, and subjective self-development. However, in
Fosshage, 1992) and in the service of working out therapeutic technique, he reverts to the use of self object concepts akin to the self psychology paradigm. He says:

In the clinical situation, a selfobject experience implies the existence of mental contents forming an intact or restored, affectively invigorated sense of self; an affirming, like-minded, or idealized other (or a combination of those); and whatever else a dominant motivation calls for. A selfobject is not a reference to actual interpersonal relations or to the internalization of functions, but to an affect-laden enhanced self-state. And the specific relationships between self and affirming, like-minded, or idealized other—that of part self, part other—gains symbolic representation in the form of such fantasies and metaphoric expressions as being merged, twin(ned), or in an inspiring relationship with another [po 134].

Thus Lichtenberg espouses self psychology clinically, although theoretically his concept of perceptual-affective-motor patterns is very similar to Stern's RIGs and are a valuable description of what appears to be laid down by early experience in the infant. Before embarking on the neurophysiological evidence supporting the concepts of self-representation and underlying the autonomy system, I would like to comment on the work of Fred Levin (1991), who has also contributed a vast amount of material correlating psychological function with the underlying neurophysiology. He describes psychologically meaningful developmental steps and relates these to the changing organization of the brain. These steps describe the appearance of an internal system for regulatory or so-called executive control, a
subject that I focus on in this essay under the rubric of autonomy. For example,

Levin notes that early on developmentally (but not limited to this period) the cerebellum helps maintain our felt sense of cohesiveness at the most basic levels of experience. Levin further says that our sense of self not only must include a perception of our body parts and their relationship to one another but also a concept of absolute space and our position within its coordinates. This information is coded within the cerebellum, has a very early onset, and seems crucial to the crystallization of an organization of self. Levin (1985), citing the work of Frick and others, also notes that self-definitional functions tend to be properties of the vestibulocerebellar system (VeS).

That is, the ves is active in coordinating the hemispheres before the corpus callosum becomes myelinated, and therefore functional. It follows naturally that what psychoanalysts call the self, which involves self-definition, differentiation, and coordination (see also Gedo, 1989), in all likelihood requires an intact cerebellar database. In essence, the cerebellum handles ideas the same way it handles actions (Levin, 1985). Whatever happens during psychosis or fragmentation states would seem to involve at least some perturbation in the availability of information from this
cerebellar data base or within other core areas responsible for crossed sensory integration. Levin stresses still another aspect of the cerebellum that suggests an important role in early self development. "There is reason to believe that within the cerebellum we create a model of the self-in-the-world and that our manipulation of thoughts about ourselves and others (i.e., our very thinking) at one time occurs by means of experimental manipulations or adjustments within the cerebellar model (Itoh, 1984, 1985). Without the cerebellar model to 'play with,' it is very likely that one would need actually to manipulate objects just to think about them!" (Levin, 1991, p. 196). Levin quotes my speculation (Hadley, 1987) that the excessive orality and need to manipulate objects seen in the Kluver-Bucy syndrome (bilateral removal of the temporal lobes including the amygdalae) are probably "the operational equivalent of throwing the organism back from limbic or cortical control of behavior into 'cerebellar mode' " (p. 3). Recent positron emission tomography studies (PET) have indeed confirmed the importance of the participation of the cerebellum in normal cognition (Andreasen, 1997). Andreasen has been able to demonstrate a neural network linking the prefrontal cortex, thalamus, and cerebellum which is activated when humans process information, recall complex concepts, or interpret narrative material. It appears that the participation of the cerebellum is essential in all cognitive tasks. It has been observed to be abnormal in schizophrenic subjects who are attempting to carry out cognitive tasks. Lastly, I make some comments on the ongoing work of John Gedo. In addition to his early hierarchical model, developed with Arnold Goldberg, he has accepted the notion of various motivational systems with the reservation that there might be more than Lichtenberg's original five (Gedo, personal communication, 1990). This present work based on my thinking, stimulated by Gedo's question of whether there might not be more than five motivational systems, suggests a sixth important element, the autonomy system. His view of self as a complex function is also most compatible with the neurophysiology of the self system as described herein. Gedo says: "'[T]he formation of a stable self organization is equivalent to the integration into a single hierarchy of aims of the disparate biologically determined motivations of the infant. Henceforth, the maintenance of this macrostructure assumes a supraordinate role for the individual" (1996, p. 174). In my conceptualization of the neurobiological process of self definition, several neural functions must unfold in an innate, genetically predetermined maturation (Table 1). In what follows, r first trace the neurophysiological
development of the autonomy system, then do the same for the organization of functions which we experience as an individual self.

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Table I The timing of appearance of self-definition-related functions

time: birth

function: attention 3 months affect & memory 6 months primary consciousness The Autonomy System 15-18 months self-reflexive consciousness & maturation of autonomy system 71

Lichtenberg (1989) published a preliminary proposal for five distinct systems,
each identifying a different set of human motivations. These systems mature and develop over time, taking on the representations of lived experience which shape the individual's specific constellation of motivational propensities throughout the life span. These motivational categories refer to behavior that is physiologic homeostatic regulation, attachment/affiliative, exploratory/assertive, aversive, or sexual/sensual. The neurobiology underlying these motivational systems suggested further modifications in the categorical delineations of the systems. These appear in my chapter (Hadley, 1989) on neurophysiology, as follows: (1) physiological, ho

meostatic regulation; (2) attachment/affiliaton; (3) exploratory behavior with assertive and aversive outcomes of comparator mechanisms of currently experi
enced stimuli with stored memories; (4) sensual activity;
(5) sexual activity. The latter two were considered distinct at that time but required further delineation in "The Instincts Revisited" (Hadley, 1992). Specifically, it seemed important to distinguish specific "sexual sensory receptors" from "ordinary sensory receptors," based on quality and distribution, including the destinations in the cortex.

edly but were not formally organized. One of the primary purposes of this essay is to propose another neurobiologically distinct motivational system devoted to the development and sustaining of autonomy. This system is closely related to the attachment system, a separate system in its own right, but frequently behaves reciprocally with the autonomy system. The neurophysiology section clarifies how this comes about functionally. Furthermore, the autonomy system contributes heavily to the development of a cohesive self-system, which then operates as a supraordinate organizational system with the goal of maintenance of a cohesive self-representation as its overall function (superseding all other motivations, i.e., the six component motivational system: homeostatic, attachment, autonomy, exploratory, sensual, sexual). 72 The Self-Organization and the Autonomy System The Reticular Activating System and the Autonomy System The development of the autonomy system is, as are all the motivational systems, dependent for its basic activation on the reticular activating system (RAS) and also, in some instances, on descending fibers in the same system for inhibition. This crucial system directs the specific actions of the overall autochthonous
(internally generated, cyclical, spontaneous firing of cells in core generators) activity of the brain. All the brain’s functional systems, including motivational systems, as well as specific focused attention, memory functions, and particularly the affect system, utilize the RAS for fine-tuning the entire overall organization of the discrete motivational systems as they are orchestrated into the supraordinate control system we regard as the self-system. The enormous amount of feedback that exists between the lower components of individual motivational systems and the frontal cortex (and back to individual systems) determines the outcome or summation of the activities which we view or experience as “self.” The frontal cortices are largely responsible for the process of summation and arbitration of which information will be brought to consciousness and what will be acted upon. More elaboration on these functions are made in the final sections of this essay. I The RAS is responsive to signals from all levels of the central nervous system, beginning with the brainstem into which it extends. The brainstem houses several sets of nuclei which produce neurochemicals that are essential for maintenance of the overall functioning of the RAS. Of these, dopamine (DA) appears most involved in "activation" (motoric functions); norephrine (NE) is more crucial for "arousal" (orienting and perceptual processing); and serotonin (5-HT, 5Hydroxytryptamine) seems to exert a widespread tonic and inhibitory function. Serotonin is known to influence the threshold for neural responses and is crucial for screening out extraneous and superfluous stimuli, thus sharpening perceptual focusing. The cerebellum is the first organizing structure in the neonate (Chugani and Phelps, 1986; Levin, 1991). The cerebellum receives sensory information from all modalities, but particularly from the proprioceptive and kinesthetic sensory systems. It is through these systems that the first sense of body is registered and located in space. This information is essential throughout life and continues to be activated when all higher cognitive functions are engaged (Andreasen, 1997). This representation of the body as a separate entity is the first building block in the emerging autonomy system. (A "representation" is not a concrete entity but a dynamic network of interconnected cells which share a propensity to fire in a synchronous fashion. When a portion of this cell assembly is activated, network properties appear, very much like the dynamic of a hologram.) I See also the essay by Levin, this volume.

JUNE L. HADLEY 73 Attention and the Development of the Autonomy System
One of the first definite assertions of autonomy (as distinct from exploration or simple aversion) is the very young infant's removal of attentiveness (disengagement) from a human stimulus which is too close to the infant's visual field or in any way intrusive, encroaching, or persistent. When intrusion is sufficiently strong, the infant may enter a state of complete disengagement of attention, or even withdraw into sleep. For mild intrusions, the infant can turn its head to disengage its gaze. If disengagement is frequent or prologed, however, it lays down patterns that will produce avoidance of human stimuli or at least attempts to minimize engagement generally. The first mediators of focused attention are the colliculi (superior for visual, inferior for auditory) which are active at birth. These are rather complicated little structures which are layered with multiple input from different systems and resulting somatic and tonotopic maps. Such maps of the world within their small confines are particularly tuned to the distance receptors (vision and audition). As the infant matures, other areas come into play as directors of focused attention, but the colliculi continue to perform important attentional functions throughout life. Two other mechanisms for regulation of attentive mechanisms become available with further maturation. First, the posterior
attention system, which is pri
marily located in the parietal cortex, begins to control orienting by the age of four to six months. The ability to "disengage," particularly from visual stimuli, becomes possible at this time. It has been proposed (Posner and Rothbart, 1994) that the attentive regul
ation of stimuli (particularly visual stimuli) may serve as an early method of re
lieving the infant's discomfort. This mechanism has been documented in infants as young as three months. Every mother has used this form of "distraction," and there is evidence that the infant discovers this mechanism and utilizes it for self
soothing. Somewhat later in the first year (at approximately 9 to 12 months), the higher level attentional system involving the anterior cingulate gyrus becomes func
tional, as evidenced by the infant's ability to handle conflicting awareness (can
reach for an object out of the line of regard). Posner and his colleagues, who have done the most extensive research in the past three to four years using PET and functional MRI (magnetic resonance im
aging) techniques, see attention implemented in the brain by networks of spe
cific neural areas. These networks are anatomically separate from the primary processing areas which respond to sensory input. Attention is not considered a property of a single brain area nor of collective functioning of the entire brain.
Attention involves three major functions: (1) orienting to sensory stimuli; (2) executive control (target detection and response selection); and (3) maintenance. The Self-Organization and the Autonomy System of the alert state (Posner et al., 1997). Orienting is believed to be related to the posterior network system which includes the parietal lobes and pulvinar and superior colliculi. The executive network includes midline frontal areas (the anterior cingulate cortex in particular) and the basal ganglia. Maintenance of alertness is dependent on the norepinephrine system arising in the locus ceruleus in the midbrain. This system spreads to widespread frontal and parietal regions, more strongly on the right. Memory Systems and the Development of a Personal History The next stage of development is related to maturation of the limbic structures (amygdala, hippocampus, and their neighboring structures). In Figure 1, we noted the timing of the appearance of self-related functions. From roughly three to six months, the functions of affect and memory (episodic) secondary to long-term potentiation (LTP) come on line. In the latter half of the first year, we have the onset of conscious awareness or primary consciousness (Edelman, 1992). To return to the first six months of life, the developing amygdala and hippocampus add important dimensions to the attentive functions. The hippocampus is particularly involved in the perception of novelty and with exploratory pursuit, which generate theta waves (at a frequency less than that of full wakeful processing but higher than resting alpha waves). The hippocampus, with its ability to habituate to stimuli and produce LTP, begins to record experience in its more permanent form (requiring manufacture of proteins which, in turn, lead to actual permanent structural changes in synaptic connectivity and function). Theta activity in the hippocampus disappears once habituation has occurred, indicating that its function is to diminish further, responding to stimuli that are no longer novel. Theta probably also serves to initiate some of the processes necessary to produce the cascade of events leading to LTP. The amygdala adds affective dimensions as new, and old memory traces are processed and compared. The amygdala also conducts environmental surveillance which can trigger orienting responses to motivational significance (potentially dangerous or rewarding) stimuli. The presence of such environmental stimuli produces a high level of alerting, causing electroencephalogram (EEG) desynchronization and the
transmission of alerting messages to both hippocampus and
the newly activated basal ganglia in preparation for
action (internal or external). The Development of Affect
and Effectance Pleasure The amygdalar and hippocampal
systems account for still another component of the
autonomy system, which manifests itself in the first two or
three months of life. This function can probably best be
called either problem solving or effectance motivation.
This fascinating phenomenon, first described by Papousek
(1969), can be routinely demonstrated in infants who are
just beginning to have func

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tioning amygdalae. Papousek's experimental design had
infants arranged so that

a turn of their heads to the left would turn on a light
display. The infants learned

this contingency rather quickly and then, just as quickly,
lost interest. The light

itself did not seem to be the rewarding experience but
rather only served as

evidence of the success of solving the problem of
contingency. The experiment

was then changed to require a right head turn to turn on
the light. When the light

no longer came on with a left turn, there ensued a period
of greatly increased

activity on the infant's part to try to reinstates the
former contingency. The infant

would experiment with other movements until the right turn
requirement was

identified. After a few reproductions of the
right-turn-light-on sequence, the rep
tition dropped to a low maintenance level ("just
checking") until a third contin

gency was required to turn on the light, namely, a left
turn followed by a right
turn of the head. Another sequence of high activity ensued until the infant dis
covered the proper action. The infants would glance at the light for confirmation
of success, then often show overt signs of pleasure and even joy at success! This
phenomenon is called "effectance pleasure" or "competence pleasure" in the
infant research literature, and "pleasure in mastery" in the psychoanalytic litera
ture. This pleasure serves as a powerful motivation throughout life unless the
autonomy system becomes damaged through environmental misfortune. The capacity to experience "effectance/competence/mastery pleasure" is
clearly innate and functions automatically by direct access to pleasure centers
even before the addition of the amygdalar-mediated pleasure component based
on comparator mechanisms comes into play as a reward mechanism. Further
more, this is not a learned function, because it does not follow the time pattern
usually seen in random learning, but rather requires exercise in early infancy to
guarantee its ongoing robustness throughout life. The Beginnings of "Permanent" Memory
At about the third postnatal month, both amygdala and hippocampus are func
tional, ushering in the era of true affectivity and the beginnings of both episodic
and presemantic memory. At this point representations become more complex
and relatively more permanent (but still "plastic" to
subsequent similar events),

providing the growing infant a "history" of his/her own
which forever remains

relatively private and personal, no matter what the
vicissitudes of social interac
tions superimpose on it. This is particularly true of
holistic or so-called
nonconscious (procedural) memory, where episodic memory is
first encoded.

Later in development, with the maturation of the left
cortex and the advent of
language (not necessarily speech but the recognition of
categories and their
names), semantic memory (verbally based) begins. The
important distinction
between episodic and semantic memory, in addition to the
fact that the first is
nonconscious and the latter is accessible to consciousness
by voluntary recall, is

that episodic memory is veridical to a much greater extent
than semantic memory, 76 The Self-Organization and the
Autonomy System which can be distorted or "rearranged" to
suit the situation or the expectations of significant
others. In other words, conscious recallable memory can
"lie," whereas unconscious memory to all intents and
purposes cannot. Conflict is frequently encountered between
these two systems (episodic and semantic memory) and call
for some form of defense to avoid the discomfort (anxiety)
aroused by such a situation. Clearly, the topic of
psychological defense warrants an essay all its own! I do
not deal with procedural memory in any depth except to note
that the basal ganglia are crucial to its development and
that the patterns of "how to do it" become a part of the
total representation of the self-system. These procedural
memories, after a period of practice, usually become
automatic and are nonconscious and much faster and more
efficient to initiate. Anatomic and Cellular Aspects of
Memory I review some of the most important facts about the
physiology of memory which need to be understood to
appreciate fully how representations are built. Simple
mechanisms of memory laid down at the synaptic level, such as habituation and sensitization, are present even before birth and appear to be inherent qualities of all neural synapses. These kinds of memory are more or less reversible as they are capable of extinction. As limbic circuits mature, the onset of more elaborate forms of memory, incapable of extinction, becomes possible as a consequence of the formation of stable neural networks. Networks may weaken through disuse and may be overridden by subsequently laid down patterns, but for practical purposes, networks are indelible unless large areas of the brain are lost. Sometimes pathways necessary for recovery (recall) of the memory are destroyed or blocked (actively or passively), which gives the impression that a memory is lost; however, in such cases, the memory is securely locked in the brain but merely remains inaccessible to conscious recall. For example, procedural memories may be accessed through priming (sensory input), but the person is unaware of their presence or how that competence arose. That is, they have no memory of the learning process. Certain portions of the amygdala mature shortly after birth and have direct connections between thalamus and amygdala (rather than the later maturing pathway from sensory cortex to thalamus to amygdala and back to cortex, usually by way of the thalamus). This early "short-circuit" functions to process emergency data such as rapidly approaching objects or other alarming or potentially dangerous stimuli (LeDoux, 1992). This rapid-firing early learning system with its memory functions is particularly indelible. It is thought to be laid down in fragmentary, sensory codes of the kind I associate with the "somatic memories" observed in victims of early trauma, as in infants and children. As the remainder of the amygdala matures, it continues to function as the mediator of emotional memory and is dissociable from the memory systems of the hippocampus (Joseph, 1996). Indeed the hippocampal processing may be viewed as a "knowledge system" whereas the amygdala systems are closer to a "belief system."

Furthermore it is now known that, when stimulus strength and arousal reach a sufficient intensity, the hippocampal system shuts down (rather than working

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in parallel with the amygdala) and only "emotional memory" is laid down.

This precludes the formation of usual declarative, recallable memory, and more often than not causes exclusion from conscious access. When patients say that they have no memory for early traumatic events, it is an accurate statement as far as they know, because only the amygdala-mediated "emotional memory" has been laid down. These have to be accessed by other procedures than voluntary recall.

The Molecular Biology of Memory

To return to the cellular and chemical mechanisms of memory, we need to understand both how cells and synapses are altered by experience, as well as how cells are connected into networks and networks coordinated into extensive representations. I begin with a cursory overview of the neurochemistry of synaptic transmission, and the mechanisms of LTP as it occurs in the hippocampus and amygdala. (LTP occurs most surely in the cortex as well, though more slowly, sometimes requiring as long as three years to be firmly anchored.) The most prevalent excitatory neurotransmitter is glutamate (an amino acid) assisted by glycine (another amino acid). Glutamate is the chemical most often associated with perception and permanent alteration of synaptic function, thereby linking cells together into networks. The glutamate molecules are secreted by
the presynaptic cell into the synaptic cleft and attach themselves to receptors on

the postsynaptic cellular surface. There are many types of postsynaptic cell recep-
tors, but the ones that are currently considered crucial to plastic changes in

the postsynaptic cell are the NMDA (N-methyl D-aspartate) subgroup of

 glutamate receptors. Stimulation of NMDA receptors allows a great influx of

Ca++ ions, which leads to a cascade of metabolic processes within the postsyn-
aptic cell. This cascade triggers gene expression and the manufacture of NCAM

(neural cell adhesion molecules)-related proteins necessary for the changes in
cell morphology (e.g., elaboration of synaptic structure, building of new syn-
apses, etc.). It also makes excitation more likely on the next occasion of

stimulation. Non-NMDA glutamate receptors continue to record stimuli without changes secondary to usage. In other words, in contrast to NMDA receptors they are not

plastic in their function (do not undergo structural changes with usage). The

same mechanisms are apparently employed in the mediation of LTP, which were

used in the formation and differentiation of structure in the developing brain.

This is a particularly beautiful example of the parsimony of mechanisms in liv-
ing systems (Bailey and Kandel, 1994).
Self-Organization and the Autonomy System Another recently identified mechanism of reinforcement of presynaptic functioning in the synapse is the secretion of NO (nitric oxide, a diffusible gas) from the postsynaptic cell which spreads readily and rapidly to adjacent tissues, including the presynaptic cell. NO only reinforces those synapentic structures that have been recently activated, thereby selectively marking only those cellular structures. The combination of the several devices reviewed in this section is currently believed to be the necessary process for forming the basic component of neuronal networks.

Linkages of Cell Networks and the Concept of "Binding" Many cell networks are created in each of the sensory modalities stimulated by an experiential event. But the question remains: How are these various networks, scattered throughout the brain, joined together to form a complete representation of an experiential event? This is the issue of "binding," which has recently received the attention of many neuroscientists. Karl Pribram (1995) has recently summarized the most probable theory of a binding process. Pribram’s answer to the question of how wide-ranging network activity in the brain gets synchronized into a unitary experience hinges on information that a 40 HZ (Hertz) rhythm is generated in the intralaminar nuclei of the thalamus. This wave sweeps from frontal cortex each 12-15 milliseconds and creates synchrony in the entire network of cells involved in a given representation, no matter how widely distributed they are. The origin of the cellular generator is the perirhinal cortex, a structure at the very core of the comparator mechanism discussed earlier under the rubric of hippocampal and amygdalar systems. Note as well that the perirhinal cortex itself borders the hippocampus. The selection of elements to be simultaneously activated as a unit appears to be dependent on processes in the amygdala and its associated frontal cortical areas. In other words a system involving the perirhinal cortex, the amygdala, the frontal cortex, and their connections seems to be essential for (1) the experience of consciousness, (2) the maintenance of overall cohesiveness, and (3) coordination of mental functioning. Higher level consciousness, which develops in a later period of time, is discussed in more detail.2 Behavioral Evidence for the Functions of the Autonomy System Now that I have established the importance and chronology of memory in the creation and maintenance of a stable history, it becomes possible to examine some of the manifestations of autonomy from the same developmental period. With the concurrent maturation of the basal ganglia, which makes possible 2 In this volume, Levin discusses consciousness
in terms of an executive control network.

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smoother and more direct motor functioning, the infant not only withdraws at attention in the face of intrusion, but actively motorically resists encroachment.

Mahler and colleagues (1975) called attention to the fact that an infant offour to five months of age will vehemently motorically resist the intrusion of a "parasitic" parent in order to keep some space between itself and the caretaker. It seems to me this is comparable to the autonomy seen when the neonate uses his/her attentional system for the same purpose. Also, if allowed, by the age of four months, the infant will lead the dyad at least half the time and apparently enjoy this assertiveness. The autonomy and the attachment systems are intimately related. Operative at birth in rudimentary form, they probably have some primitive memory from intrauterine experience in terms of familiar action patterns of the infant's own movements, as well as familiarity with the mother's voice and cyclical activity patterns, and so on. In the earliest stages of development, it appears that the attachment and autonomy systems record experience (separateness and togetherness) in parallel, but as maturation progresses these systems segregate information along the lines of "aloneness" (to the autonomy...
ness (to the attachment system). There are undoubtedly system overlaps in such representations. The distinction of the two assignments of experience to either system probably depends largely on the deployment of the attention mechanisms either inward (autonomy system) or outward (attachment system). That attention cannot be simultaneously focused inward and outward parsimoniously accounts for the flexible reciprocity of the two systems. As experience is accumulated, inner representations remain fairly well balanced between the autonomy and the attachment systems, that is, providing in interactions with caregivers are optimal. If, however, in the case of nonoptimal caregiving, either the autonomy or the attachment systems are used preferentially. This pattern can become dominant as an expression of the individual's preferred mode of functioning. Possible outcomes run a continuum from total self-absorption, through various interactions of both systems, to the extreme of object attachment, so-called "symbiosis," in which virtually all autonomy is essentially surrendered (merger). In such a state of merger, object representations are imbedded in the self schema with consequent loss of boundaries. The "will" is projected to the "other," and action is dependent on the ability of the infant to read the wishes of the
"other" and carry them out. In this scenario, the infant may experience his/her locus of control as outside itself, and in extreme cases the infant may totally lose awareness of autonomy or internal power. At the time of maturation of both right and left frontal cortices, as well as the anterior cingulate gyrus (Posner, 1994; Posner et al., 1997; also see Levin, this volume), when these cortical mechanisms contribute more decisively to executive control (attention) processes, behavior becomes less flexible and habitual so that the Self-Organization and the Autonomy System patterns relatively more "hard wired." Hopefully the "mother" has offered the infant a well-balanced experience of separateness and togetherness, which can be mutually satisfying and leave behind a healthy substrate for future functioning. The next dramatic maturational shift occurs when the maturation of the frontal cortices adds several new competencies: (1) for enhanced self-reflexive awareness; (2) for recall, with awareness, of absent objects; (3) the capacity to hold recent events in working memory (dependent on reverberating circuits in the frontal cortical assembly) for comparison with other representations; (4) the ability to predict future events from past memory; and (5) an expansive exuberance which feels to most observers like a real "celebration of life." These developments lend a special excitement to the infant of 12 to 15 months, suggesting that development and maturation are interacting efficiently with striking effects. This exuberant "practicing" stage (Mahler et al., 1975) is supported physiologically by the maturation of the right orbitofrontal cortex, which matures ahead of the left hemisphere. Schore (1994) has done a magnificent job of explaining how the differential maturation of the two major systems of frontal cortex and the two hemispheres interact to produce both the "practicing" and "rapprochement" periods of infant development. He explains that the orbitofrontal "system" includes the orbitofrontal cortex, the ventrolateral caudate nucleus, the centromedial nucleus of the hypothalamus, and the septal nuclei. These structures form a "permissive" system which requires the indulgence of a proud mother. The practicing stage in the
infant's life is usually the last time when unbridled exuberance feels permissible. Soon after this supremely autonomous era, the left dorsolateral frontal cortex begins its inevitable maturation with its contribution of primarily inhibitory functions. The dorsolateral "system" includes that area of the frontal cortex, the anterodorsal caudate nucleus, the lateral pallidum, the subthalamic nucleus, and the hippocampus. When maturation of the dorsolateral system, which is also closely affiliated with the locus ceruleus and noradrenergic dominance, begins to manifest its inhibitory functions, the formerly unrestrained self-organization experiences great upheaval. At the same time, the parental, particularly the paternal influence, begins to set limits and restrict the child's behavior. The latter development usually leads to monumental power struggles in the infant, both internal and external. During this time, the attachment and autonomy systems are at all-out war. Just as the unbridled exuberance of the previous period was a lifetime "high," the ensuing inhibition is probably the cruelest challenge of a lifetime to the developing autonomy system. The outcome of the infant's and parents' negotiation of this crucial developmental period has profound effects on the child's future adaptation to his/her social environment. The two extremes of the continuum of possible outcomes would appear to be the development of ideals and imperatives (with a persis

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tence of activities motivated predominantly by the infant's independent v

ion) versus an almost total dependency upon attachment figures. The absolute necessity for the parents to take advantage of the maturation of

the child's left dorsolateral frontal cortical inhibitory system to instill social re

straint is clear, but, at the same time, children should not be shamed or intimi
dated into the wholesale abandonment of their natural autonomy. It is a miracle

that parents and children survive this period, only to have to repeat the process

again as parents and bigger, stronger, more aggressive (but
seldom wiser) ado

ado

lescents. A final word about the role of the autonomy system. Creativity cannot occur without autonomy in the sense that the exploratory system is essential for the initiation of any activity, and assertiveness is necessary for carrying it through into action. The sensual system also adds content to creative activity, but the most essential component is really the contribution of the autonomy system in producing acts of self-expression. These acts would appear to be a mature form of the infant's propensity to "make things happen," and they express the satis faction and pleasure derived from such self-initiation. The Organization of Self-Cohesion

I have now traced the maturation of the brain and its contributions to the develop separate motivational systems and their interactions with one another and the environment. These components are shaped by experience and maintained in relatively stable patterns mediated by memory, so that they work together either in harmony or in conflict. When conflicts arise, they are resolved for better or worse through compromises that are called defenses which essentially minimize the experience of discomfort (anxiety). The overall system is organized to maintain an optimal level of activation (neither manic nor depressed) and to maintain enough harmony among the mo
tivational systems for smooth functioning without undue discomfort. This also

ensures an optimum level of familiarity of patterning, resulting in a sense of

continuity. These patterns express both those defenses characteristically used,

as well as the idiosyncratic relationships between motivational systems. The importance of personalized patterning is captured by Penrose (1994) when

he says, "Thus, matter itself is nebulous and transient; and it is not at all unrea

sonable to suppose that the persistence of 'self' might have more to do with the

preservation of pattern than of actual material particles" (p. 14). The representations developed and maintained by memory are distributed

neural networks which are activated in widespread areas of the brain by sweep

ing waves generated in the perirhinal cortex (temporal limbic), with distinctive

"flavors" added by the amygdala and its frontal cortical projections. The frontal
cortices (both right and left), with the anterior cingulate cortex, operate as "senior Self-Organization and the Autonomy System executives" within the executive control network of the brain, once they begin to mature at about 10 to 12 months of age. They are most intimately associated with the amygdala and hippocampus and are regarded as "limbic cortex." Their ability to alter so many of the functions of the brain lies in their ability to influence attentive processes both excitatory and inhibitory. The frontal and anterior cingulate cortices are also the "keepers of consciousness" insofar as they direct which information can be routed to the left cerebral hemisphere and then remain activated for a minimum of 500 milliseconds, which are two of the necessary conditions for conscious awareness (Libet et al., 1979). The right hemisphere is more powerful in evoking attentiveness in both hemispheres than the left, which is
only able to respond to unilateral stimulation. Right parietal activation is sustained much longer than left, and injury to the right parietal lobe is considered the substrate for unilateral "neglect" syndrome which is due to lack of attentiveness to the "neglected" side. This neglect may cause the disappearance of any awareness of the left side of visual images or, in the extreme, eradicate any awareness of the existence of the left side of the body. This is a good example of how attentiveness is essential in the mediation of a total perception of self-organization. After all, in our definition of "self," the ability to distinguish the characteristics of "me" from all others is basically a cognitive skill, a function, not a structure (Gedo, 1997, personal communication; 1993, 1996). The reification of "self" as a noun probably has its origin in the use of language for purposes of communication. As Joseph (1996) points out: "Via language one may form an abstraction of one's sense of Self so that it may be scrutinized from multiple verbal perspectives as well as modified or even disguised in accordance with an idealized self-concept" (p. 564). The risks of misunderstanding the word, if it is not very carefully defined, are innumerable, and we must be careful when we use the concept of self to define it in its functional sense to be strictly correct. The disruption of the overall unity of self-experience is the most dreaded of all experiences humans can suffer. There seems to be a primitive awareness of what this sensation would involve, and one wonders if this is a state that infants suffer transiently before there is sufficient organization of brain function to prevent such a condition. The sensation reported by adults is one of disintegration, "falling apart," annihilation, total panic, or utter disorganization of both body and mind. The threat of disorganization posed by highly terrifying events or even a loss of sufficient familiarity (and therefore predictability) in experiential events can produce this dreaded sensation. Without prior experience to guide the individual, there is a sense of utter and overwhelming helplessness. Now that we have established a neurophysiologic substrate for the systems for autonomy and a basis for self-cohesion, we can look forward to an exploration of conscious and nonconscious mental processes.

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It will probably come as no great surprise that the structures necessary and sufficient for conscious mental processing are the same
structures essential for
maintaining the cohesion of the self-system with a few
further conditions and
provisions. It is amazing how these two systems (conscious
processing and self
cohesion) interact in concert.

So consciousness as a noun loses much of its mystery and
becomes instead a
function of an exceedingly complex, evolved brain,
functioning at its highest
cortical levels.

With the proliferation of imaging techniques (PET and MRI,
for instance)
and the enormous amount of experimental data, it is indeed
an exciting time to
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Nothing in nature is random ... A thing appears random only through the incompleteness of our knowledge. -Spinoza

Our job is not to penetrate ... the essence of things, the meaning of which we cannot perfectly know anyway, but rather to develop concepts which allow us to talk in a productive way about phenomena in nature. -Niels Bohr

This essay considers how best to apply chaos theory to psychoanalysis. The increasing number of publications on this challenging subject requires some exegesis that is understandable by individuals not trained specifically in mathematics.

Levenson (1994) is quite skeptical that anything useful for psychoanalysis will ever come from chaos theory. However, others strongly disagree and see a great potential for chaos theory to benefit our field. In the United States, Galatzer-Levy (1978, 1995, 1997) and Moran (1991) describe the utility of chaos theory...
in explicating development, quantitative to qualitative shifts, and the importance

of recognizing fractal-like signatures in psychoanalytic clinical material. Levin

(1996a, 1997a, b) believes chaos theory offers a unique vocabulary and per

spective which might further our understanding of learning, development, and

psychopathology. Forrest (1991 a, b, 1995, 1996a, b) explores the boundary of

An earlier version of this essay was presented as the discussion of Robert Galatzer-Levy 's

lecture on chaos theory to the Chicago Psychoanalytic Society, October 28, 1997 (Galatzer-Levy,

1997). 85 86 Learning, Development, and Psychopathology psychoanalysis, artificial intelligence, and chaos theory, finding much that can be positively applied to developmental psychology and psychopathology. Gleick (1987), Moran (1991), and Spruiell (1993) explain chaos theory, raising a broad range of theoretical issues. Sashin (1985) and Sash in and Callahan (1990) demonstrate stunning mathematical results, 1 employing unique affective response models. And Moran (1991) and Galatzer-Levy (1995, 1997) have each made integrations, the most important of which appears to be the idea that psychoanalytic process reduces psychopathology by adding complexity to mental functioning. In this regard, Palombo (1998), writing about coevolution,2 sees dreaming as "the edge of chaos" (p. 261), resulting in learning as the adaptive reorganization of memory. Outside this country essays on chaos and psychoanalysis have appeared in France (Quinodoz, 1997), Israel (Priel and Schreiber, 1994), and South America (Matte-Blanco, 1986, 1989).3 These significantly add to our knowledge of what chaos the phenomenon might be accomplishing, and seem to comprise two related notions: that chaos facilitates learning by means of symmetry breaking (elaborated on below), and that chaos plays a role in transference as well (Levin, 1996a, 1997a; Priel and Schreiber, 1994). In what follows I wish to clarify what appears salient in the oeuvre on chaos theory, so that readers can better form their own opinions about such matters. Let us begin with a discussion of the
idea that chaos theory offers a descriptive vocabulary for and a better way of framing psychological development.

Development In discussing developmental theories, Galatzer-Levy (1997) critiques the idea that proper development in children essentially correlates with reaching atypical norms. Paraphrasing Anna Freud, he notes that when development is progressing, even if it deviates from the norm, the child has nevertheless engaged the major psychological task of childhood. Yet, we may ask, if individuals follow different pathways, then what exactly is normative about development and how are we to understand variations in the process? It seems clear that we I These results appear in a superb article in The Annual of Psychoanalysis (1990). 2 Utilizing Stuart Kauffman 's ideas about self-organization, Palombo has written brilliantly on applying evolutionary theory to the mind/brain to understand what happens in ego development or in psychoanalysis. , Matte-Blanco's work is explained to some extent later in this essay, especially that part most relevant to chaos theory. 4 In his concept of "Neural Darwinism," Edelman (1987) sees development as a stochastic process that involves complex interactions and communications between migrating and functioning brain cells, surviving and dying brain cells, and the very processes that these cells subserve. Through massive connectedness (what Edelman calls reentry) mind/brain systems create "values." Ultimately, the process is adaptive, warm blooded and biologic, not cold and machine like.

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have too many developmental theories and too little agreement among them to reliably answer such questions. Moreover, each of the current coterie of developmental theories cannot be correct because their assumptions are different and mutually exclusive. Such are the difficulties in improving the situation of finding an overarching theory of development. Eventually it would be nice to create a developmental model that builds itself up from basic starting conditions. At present no psycho
analytic model of development strictly meets this requirement, although Gedo’s hierarchical model comes quite close. Yet this is where chaos theory appears to offer something useful to psychoanalysis because chaos theory shows a robust capacity to portray the evolution of systems, making it a natural candidate for solving the modeling problem. My meaning here will become clearer shortly when I describe the Feigenbaum Diagram and touch on so-called attractors. Chaos theory is an outgrowth of work early in this century by Poincare (1916–1954), and in more modern times by Rene Thorn (1975). The terms fractal and chaos were coined in 1971. The advent of the modern desktop computer is the decisive discovery which permitted widespread experimentation with complex chaotic systems and thus the accurate solution to otherwise intractable problems in differential equations. 5 Chaos Illustrated: The Feigenbaum Diagram

The core idea of chaos theory can be demonstrated most simply by reference to the Feigenbaum diagram (see Figure 1), which represents the graphing of an equation, called the quadratic iterator, which reads as follows: \( x_{n+1} = ax^n(1 - x) \), where \( n = 0, 1, 2, \ldots \). In Figure 1 the various values of the left side of the equation appear on the y-axis, while the x-axis denotes time (that is, the number of iterations). For values of a below 2, the value of \( x_{n+1} \)
slowly increases. For

values of a between 2 and 3, the value of xn+1 bounces
back and forth between 5 Some problems in mathematics,
especially differential calculus, according to
Galatzer-Levy,

were once solved only by approximation, or not solved at
all because of the difficulty factor.

After chaos theory was invented and applied to calculus,
however, it became possible for the first
time to find real solutions to some of these intractable
problems. In the process of using comput

ers to model such solutions, amazing pictures also emerged
of highly suggestive phenomena that

underlie complex behavior within mathematical systems .
These phenomena are the subject of the

latter parts of this essay. 6 In other words, values of x
are computed using the formula. Each value is computed by

subtracting the previous value of x from the number 1 and

multiplying that number by the number a

(and also by the previous value of x1. In the series, the
calculations of x start with x = 0 and

continue for a extremely large number of iterations . The
Feigenbaum Diagram graphs these val

ues on the vertical axis, with sequential values of the
variable a moving from left to right along

the x or horizontal axis. As this happens a most
remarkable pattern appears that no one anticipated

before computers made these calculations and graphs with
exquisite precision. ... 0.2722
3 0.594 3.45122 3.5 ,-------------1---------:;;;1f1 0.4636
3.54416 3.56 Figure 1. Self-similarity in the Feigenbaum
Diagram. This is a copy of Figure 11.3, page 589, from
Chaos and Fractals: New Frontiers in Science, by H. O.
Peitgen, H. Jürgens, and D. Saupe (New York:
Springer-Verlag, 1992). Reprinted with permission of the
publisher.
two relatively fixed values. But if \( a \) is larger than 3, especially as it approaches 3.5699456 ..., then \( x_{n+1} \) begins to fluctuate first between 2 values, then 4 val
ues, and so on in a cascade of rapid doubling (also called bifurcation). Such

rapid doubling of the value of \( x_{n+1} \) is, by definition, the onset of mathematical
chaos. The onset of chaos always occurs at a point (along the \( x \) or horizontal axis) of

3.5699456 ... which is now known as the Feigenbaum point. Moreover, each

interval of doubling, divided by the subsequent interval of doubling, is also a

constant, 4.669206 ... which is known as the Feigenbaum number (sigma). In

other words, rapid doubling (chaos's onset) occurs 4.6692016 ... times faster

with each doubling event. What is most interesting, however, is that each of these numbers (the

Feigenbaum number and point) are constants in nature, such as \( \pi \) (3.14159 ... ),
or \( e \) the base of natural logarithms. Whether \( x \) is the rate of firing of a brain cell,
or water dripping from a sink, or an oscillation in an electromechanical system,

the graphing of chaos in nature always produces exactly the same Feigenbaum

diagram, characterized by the Feigenbaum point at chaos's onset and the

Feigenbaum number relating to the rapid acceleration of periods of doubling! Now another unexpected finding; If
any portion of the chaotic pattern of the Feigenbaum diagram would be enlarged, it will reproduce the pattern of the original Feigenbaum diagram! This can be repeated as many times as one likes, always with the same result, and it represents the so-called fractal quality of nonlinear dynamical systems. Applying Mathematics to Psychoanalysis

A brief word about the history of attempts to bridge psychoanalysis and mathematics seems in order. The pioneer modern psychoanalyst polymaths are Robert Galatzer-Levy and the late Jerry Sashin (who died in 1990 before he could complete his important contributions). Let me quote briefly from Jerry Sashin to further explain our subject and also introduce the relation of chaos theory to neuroscience: 7

This means that as we move to the right in the Feigenbaum diagram, once chaotic or rapid doubling has started, each doubling occurs more than four times faster than the time the previous doubling required. This is what produces the sensational cascading pattern. One commonly known fractal is the snowflake, which has the shape of a six-pointed star when looked at grossly. Under the microscope, however, the six-pointed shape appears to be a fundamental unit from which the entire snowflake is made. That is, no matter how many magnifications, we continue to see six-pointed shapes as the essential components from which larger elements of the snowflake are composed. 90 Learning, Development, and Psychopathology Catastrophe theory models form a bridge between the psychology and the corresponding
neurology. I'll try to explain how. When you study the dynamics of systems involving oscillators, you discover that coupled oscillators show behaviors which are described (modeled) by catastrophe theory models. What this suggests (since many localized regions of the brain can be characterized as oscillators) is that ... affect-response is determined neurologically by [the following]: the coupling of the regions of the brain having to do with fantasizing, with language, with containment [meaning the container function] and [with] emotion. Since emotion is probably in the limbic-hypothalamic region, [visual] fantasizing ... the occipital area, language ... the left [hemispheric] cortex, and containment ... the prefrontal region (all of this being greatly oversimplified and now out-date [of course]), what we are dealing with is not just linkage between left and right [hemispheres] as proposed by Sifneos, Hoppe and others, but also up/down (cortical-limbic [cerebellar]) and anterior/posterior linkage as well 10 (personal communication). In this early phase of his work, Sashin pursued his research at Rene Thom's institute in Paris, Thom being one of the guiding geniuses behind chaos theory. Development and Growth: The Edge of Chaos Galatzer-Levy's (1997) core idea is that the mind is a complex system on the edge of chaos, that is, with sudden lurches of change rather than smooth progression. A good example of such change, outside of the realm of psychology, will help the reader understand better what is intended here, that is, the surprises that lurk within changes. Consider the seemingly simple subject of how humans grow in height. Medical schools teach that height growth is continuous, that is, a smooth curve; many of us remember the smooth growth curves for infants and children in texts and 9 This containment parameter may be decisive for the outcome of successful development because the ability to contain (i.e., manage affect or self soothe) is a requirement for successful adaptation generally. Further comments are made on this container function at the end of this essay, where Sash in and Callahan's 1990 work is elaborated on. 10 At the same time that Sashin worked with Rene Thorn, Professor Utena of Tokyo University was pursuing his so-called Kabuki model, named after the movable stage in Kabuki plays. Utena's model, just as Sashin's model, is described by its originator in terms of the brain's connectivity running in all directions (see quoted personal communication from Sash in), not just integrating left with right hemisphere, and this complexity is understood by each to be critical for the integration of cognition and emotions. It should be noted, however, in
spite of the similarities noted, that the difference between these two models is that Sashin’s was a chaos theory model, whereas Utena’s was not specifically related to chaos theory. In spite of this difference, I believe it is important to mention Utena’s model in this instance to remind the psychoanalytic reader that the work on chaos theory (of Sashin), like the Kabuki model (of Uiena), was an attempt to understand mind/brain functioning so that this understanding could be applied to improve our psychoanalytic theory of learning.

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hospital charts. This is all well and good, except we now know that this view of smooth linear growth in height is now understand to be completely wrong! In reality, human beings spend most of their youthful lives, over 99 percent of it, not growing at all! What happens, rather, is that possibly one evening a month there are massive lurches of growth (i.e., spurts) during which all of the growth occurs for that month. Such growth spurts represent a very small percentage of the overall time of one’s life, in between which there is actually zero growth. The subject of growth is important to this discussion because, as we saw in the Feigenbaum diagram, chaos theory is robust in its ability to mathematically describe developmental patterns, such as the growth of trees, snowflakes, brains, or minds, and it can do so with accuracy and beauty. Interestingly many such processes involve the repetition of self-similar patterns at decreasing scale (cf., fractal geometry), which it turns out can be expertly modeled with computers. Galatzer-Levy (1997) further suggests that when analysts observe in their
patients sudden dramatic episodes of psychological growth, we should not be
too quick to dismiss these as events of unlikely or exaggerated significance. II

For example, he describes the case of a Mrs. R, a woman who changed suddenly
and dramatically around the time of seeing a particular movie scene, that is, in
response to only very slight changes in her ordinary mental state (initial condi
tions).12 Here Galatzer-Levy chooses his words very carefully in order to intro
duce an apparent isomorphism 13 between chaos theory and psychoanalysis. II In other words, that such changes are
too quick to indicate real or significant psychological development. 12 By making reference to the effects of slight changes in initial conditions. I am not arguing
that when this is observed in and of itself it means that the system being considered is proven to
be chaotic. Rather I am reasoning that because chaotic systems are invariably sensitive to such
initial conditions, the appearance of this quality requires one to at least consider the possibility
that one is observing the effect of a chaotic system. This may appear to be a subtle distinction, but
it is important for readers to appreciate this orientation, so that they remain open to the main
arguments of this essay, which are intended to introduce chaos theory, familiarize the reader with
some of its characteristics, and thus enable the reader to follow the arguments and clinical ex
amples so as to better appreciate the exciting interest within some circles of psychoanalysis in
applying chaos theory to psychoanalytic theorizing. If I would like to emphasize that I am not asserting that the repetition of patterns with fractal like qualities does not automatically imply the existence of chaotic systems. It is obvious that such behavior could simply reveal lawfulness without any reference to an underlying chaotic behavior. However, it seems reasonable to wonder, as does Galatzer-Levy in all of his publications on chaos theory and psychoanalysis, that at least some of these self-similar patterns of behavior (appearing on differing time scales) within psychoanalysis might reflect a deep process within mind/brain that is operating within a chaotic system. It would be foolish to ignore this possibility. In fact, this is why so many scholars of psychoanalysis have begun to examine the area of chaos theory to see what payoffs might be won for our field by considering carefully such possibilities and pursuing them thoroughly. Learning, Development, and Psychopathology namely, the potential in each domain for small changes in initial conditions to profoundly affect the outcome of complex systems, what in chaos theory is called the so-called "butterfly effect." An example of such sensitivity to initial conditions has already been presented, in fact, in the case of the Feigenbaum diagram, which as you remember, is dependent on the fact that changing the initial value of a only slightly in our equation resulted in radically different outcomes, only one of which led to the onset of chaos, characterized by periods of rapid doubling. Let us consider as a second example of rapid change, a clinical vignette taken from an article by Wolf (1990) to illustrate this same sensitivity to initial conditions, but this time within a clinical psychoanalysis. Wolf indicates that Franz Alexander was very frustrated with a certain male patient, who seemed narcissistically entitled. One day the patient came into Alexander's office with mud caked on his feet and dirtied the analytic couch. Alexander screamed at his patient to get his feet off the couch, which proved to be the decisive moment in this young
man's treatment, after which things really improved! Alexander attempted to understand what had happened by examining the changes in initial conditions between usual sessions with the patient and this particular occasion: The analysand's father had always indulged him, but now his analyst, in a father transference, was not indulging him. However, what was more interesting was that this time the angry analyst-as-father was nevertheless seen by the patient as remaining essentially on the patient's side. Alexander felt that it was the patient's experience of this discrepancy between the image of the historical father and the image of the person of the analyst (especially around how they each handled really frustrating situations) that led to insight and sudden, unexpected growth. Although we would all surely differ over what actually changed in Alexander, his patient, or their analytic work that allowed the patient to finally see Alexander as a good but angry father figure, we might nevertheless agree that we are very much in need of a productive way of communicating about the phenomenon of such change, especially as occurred in this case. Chaos theory offers a special terminology for communicating about change; it also offers a unique way of thinking about the conditions associated with change, that is, in describing initial conditions in a systematic way. 15 14 The so-called butterfly effect suggests that the added presence of a single butterfly somewhere in the world, say Japan, can be shown to have ramifying effects on the weather in a place completely around the globe, say Chicago. 15 It may help some to emphasize that the discussed influence of initial conditions need not imply particular outcomes. I am merely arguing that it is worth speculating that some psychological systems are characterized by a sensitivity to initial conditions and thus are chaotic systems. This means that some psychological systems may turn out to be governed by chaotic mechanisms, although this clearly remains to be proven. However, without some limited and useful speculation, it is not possible to advance any field.

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For example, chaos theory allows one to talk of such things as transitions into chaos, where the time intervals of doubling shorten according to a determined rate (for example, RFeigenbaum's constant) and where the emerging patterns
demonstrate a beautiful orderliness, as seen in the Fiegenbaum diagram (and a related figure, the so-called Mandelbrot set).

What makes these factors relevant to psychoanalysis is the notion that, arguably, each of our patients shows a consistent signature in their pattern of being (Galatzer-Levy, 1997). One could argue that this signature is fractal-like in that it reappears at various levels of "magnification" in the patient's behavior and thinking. In other words, such patterns of thinking or associating can be observed in the patient's grossest behaviors over years of time, or seen to emerge repeatedly over different time scales: months or weeks or even over minutes in a single session.

Chaos theory further allows one to actually quantify the amount of chaos in a given system. Finally, there are so-called strange attractors which are specifically what depicts the exact temporal and spatial trajectory of chaos. Let me explain attractors further.

Attractors in general are "... geometric forms that describe the long-term behavior of... [nonlinear] systems" (Priel and Schreiber, 1994, p. 214), that is, systems where the output is not proportional to the input. More specifically,

"... an attractor is what the behaviour of the system
settles down to, or is [conceived of being] attracted to ... " (p. 214), such as a pendulum's movement over time toward a fixed point of rest. This rest point is described as a simple attractor because it is as though the single simple rest point "attracts" the pendulum. Limit cycles are a second intermediate type of attractor; these have trajectories that reach, as a limit, the contour of a closed loop, that is, they do not settle down to a simple point but rather to a loop. An example of such a limit cycle would be the repetitive movement of a clock pendulum following a more or less constant loop trajectory, without slowing down from friction because the system has an external source of power. Finally, there are strange attractors which show the most complex (and interesting) trajectories of all, such as are seen in chaotic systems. An example is the famous Lorenz attractor, which loops back and forth, first inside one cluster of concentric elliptical shapes, then inside a companion cluster.

16 The Mandelbrot set, a fascinatingly beautiful diagram of chaos, is a close relative of the Feigenbaum diagram, and it is named after Bernard Mandelbrot who did so much to establish the mathematics of fractals and their computer applications.

17 This is accomplished by means of something called Lyapunov coefficients.
This is in contrast to most of the mechanical systems with which we are familiar wherein the input and output are proportional. For example, the more you step on a brake pedal in your car, the more the car tends to stop.

Learning, Development, and Psychopathology All these attractors express the dynamics of a variety of forces, some of which expand and others that serve to contract, brake, or condense trajectories within phase space (Quinodoz, 1997). Most interesting, the trajectory of strange attractors is self-repeating on smaller and smaller scales, so that in the case of strange attractors fractal qualities are always the rule. Quinodoz, under the influence of French/Swiss culture, sees these attractors as constructed much like French pastry or bread, with multiple inner foldings or, you might say, layers of self-sameness.

The very novelty of the terminology of chaos theory, of course, is potentially confusing, at least at first sight, but the ideas expressed may turn out to be useful to psychoanalysis exactly because they capture change in a universal language. Moreover they (like the differential equations which lie behind them) wrestle with the precise nature of change, that is, with its geometry and timing. Mathematicians think of such qualities of attractors, mapped onto a multidimensional phase space, as reflecting the various identifiable factors whose alteration changes or shapes the trajectory of their system. So we can begin to understand that because chaos theory constitutes a very precise way of denoting change qualitatively and quantitatively while simultaneously noting the role of specific factors producing the change, it becomes more reasonable that Galatzer-Levy and others believe such mathematical descriptions might enhance our understanding of such things as psychological development by adducing the mathematical rules underlying complex outcomes. This orderliness is reflected in Mitchell Feigenbaum’s diagrams, and particularly in Feigenbaum’s formulation of what he calls universality. This term refers to the following idea: the point in the Feigenbaum diagram where chaos starts (that is, the particular value of “a”) logically contains within it all of the information that is manifested by all subsequent chaotic events. Moreover, as I noted earlier, and this has been a surprise to everyone: the pattern of chaos depicted in the Feigenbaum diagram of Figure I appears to be universal in the sense that virtually all chaotic phenomena studied in nature to
the mathematical diagrams. These are usually
two-dimensional drawings which depict events that can be
considered to be of three or more dimensions. The word
trajectory implies that if you watched the diagram draw
itself, say on a computer, you would see the picture start
at a single point, and then move across the two dimensions
of the screen in a complex pattern, leaving behind it a
line which represents a picture that in essence is the
attractor. This pathway could be simple, or complex, but
it is a clever way of showing development. 20 Japanese
sword makers discovered how to make the strongest swords
over 1,000 years ago by folding the forged steel upon
itself repeatedly, forming what can now be recognized as an
inner fractal geometry (similar to that in French bread).
21 This is a mathematical way of saying that the
trajectories we label as chaos are predetermined by exact
specifiable mathematical equations which we can discover.

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this point are structured mathematically identically. This
gives us a feeling that

we are discovering some decisive orderliness in nature.
Complex nonlinear be

avior no longer seems random against the backdrop of our
growing knowledge

of chaos which reveals the hidden order of various
phenomena. Another interesting aside: the transitions
zones from order into rapid dou

bling (and also back) are actually themselves neither
orderly nor chaotic per se

but something sui generis. Such transitional zones are
perhaps the most interest

ing special states demanding scrutiny in this new science
of chaos. Psychopathology and Complexity

Lest one conclude that all this mathematical gobbledygook
is too arcane to be

relevant to psychoanalysis, consider that psychoanalysis
has long been fixated

on how seemingly small differences in initial conditions
radically may some
times alter outcomes! In fact, this is why we analysts pay special attention to the
direction and time course of change and shifts in state of our patients. As in the
case of Wolf’s depiction of Alexander and his patient, part of every transference
analysis involves attention to such details. Moreover Freud’s so-called genetic
hypothesis, along with our general attempts as analysts to understand what par
ticular experience means to a given patient, also relies on our analysis of the
effects of subtle changes in initial conditions. In fact, one can argue that psychoanalysis has literally been built on this ques
tion of understanding precisely the effect of subtle initial differences in personal
meanings or interpretative responses or both, variables that fluctuate and inter
act in a lawful manner. So we are each of us, without knowing it, from the math
ematical perspective, already deeply involved with chaotic phenomena; there
fore it makes good sense to make use of chaos theory to shed further light on
mental processing. Let us now turn briefly to the issue of pathology, which involves special pat
terns of mental functioning. Galatzer-Levy, Levin, and Moran seem to agree
that either extreme regularity or extreme disorganization are capable of leading
to psychopathology, from the viewpoint of chaos theory. It will help, however,
to clarify that the freely fluctuating states of chaos and regularity, which occur in complex nonlinear systems, are probably normative in the sense that they are expected properties of complex systems, that is, they obtain when such systems are working properly. In other words, we must be careful not fall into the trap of connecting chaos itself with abnormality. Rather, from the vantage point of chaos theory, abnormality would seem to occur when the mind/brain gets locked into either chaotic or highly regular states, rather than shifting naturally in and out of chaos in a dynamically normal yet complex manner. In other words, psychopathology might be considered as the lack of freedom. In contrast with freedom, fixity, or the aberration from the variable pattern of entry into and exit from complex systems, could be considered the real psychopathological culprit. To think of such fixity, just reflect on obsessive compulsive illness or any significant character disorder. Utnera (1996), whose Kabuki model was touched on in note 10, has commented on the significance of freedom in exactly the sense earlier implied. He writes that we all need to be free in terms of three variables: freedom in the sense of having optimally functioning brains (which is where the various biologically oriented interventions come in); freedom in terms of mastering psychological development, which allows us to access the functional capabilities of our mind (which is where most psychotherapy and psychoanalysis enters in); and freedom to enjoy living within a community of other people (this is the important social domain). For Utnera, normal development is that which supports or creates having choices. As analysts we work hard to assist the actuation of each such freedom in our patients. In other words, imagine that mental freedom reflects the proper free functioning of chaotic systems in mind and brain. Or, as Moran (1991) puts it, some psychoanalytic interventions might essentially be working by adding complexity to nonlinear systems and thus
interfering with fixity. The Case of Learning Let us now address the variable we call learning. Although there is as yet no generally accepted psychoanalytic theory of learning, there have been continuing efforts to apply interdisciplinary perspectives toward this purpose (Levin, 1991, 1997b; see especially chapters 1-5 of Levin, in press). In what follows I elaborate further on such a learning theory, but this time focused on Priel and Schreiber’s assertion that shifts into chaos are important facilitators of learning. Priel and Schreiber (1994) make two decisive points. First, they highlight Freud’s historical description that logical chains of associations involve two or more threads of associations meeting and proceeding as one. They see this formation of associative chains as neatly overlapping the mathematical perspective of a bifurcation point topographically, but “where one [or more] of the ramifications has been suppressed” (p. 212). It should be noted that these researchers are assuming, without exactly saying so, that the acquisition of knowledge (i.e., learning) accrues from the expansion and increasing depth of associative trees. Second, Priel and Schreiber (1994) state explicitly that the psychoanalytic transference phenomenon is illuminated when seen in relation to the behavior of the so-called strange attractors of chaos theory (p. 214), where transferences are “transitions from [non chaotic] limit cycles [i.e., intermediate attractors] to strange [i.e., more complex chaotic] attractors through [the mechanism of]

bifurcation”22 (p. 214). In other words, these authors believe that “bifurcation potentially creates information . . . [through the mechanism of] space symmetry breaking ”23 which they see as “the necessary prerequisite without which the possibility of constructing an information processor simply would not exist” (p. 214).

(Incidentally, what Priel and Schreiber refer to as a system within which occur shifts in attractor seems to me to coincide with the previously mentioned in creases in the direction of system complexity. Such
complexity is an antidote to psychopathology.) But what then is symmetry breaking? I shall take this up next. Symmetry Breaking

The term symmetry breaking appears in physics, computer and engineering science, cognitive neuroscience, and psychoanalysis. Within cosmology it refers to a creative phase in the origin of the macroscopic universe consequent to the so-called Big Bang, where the original symmetry (homogeneity) is broken and apparent local concentrations of matter settle out as the known subatomic particles, elements, and galaxies of the universe. 24 Within the related field of par bifurcation, as mentioned earlier, is rapid doubling, and it is associated with the onset of chaos. Now some may reason that if transferences, as described by Priel and Schreiber (1994), are connected with such transitional states (and also with complex attractors), that (1) they are highly dynamic and transient, and that this does not accord with clinical experience in which transfers are usually seen as states of relatively fixed perceptions and meanings, and (2) that transfers are thus confusing because they are seemingly associated clinically with pathology, and yet their association with complex attractors would seem to imply that they are associated with normality, which I have argued above is associated with complexity! Let me attempt to clear up any possible confusion. First, regarding the first point, I wish to argue that I am not asserting that
transferences themselves have any fixed relationship to normality or pathology. Along with Priel and Schreiber, I would argue that bifurcation points in all likelihood contain/express information that ultimately might get tapped in the expression of transferences. But even if this speculation would be correct, it does not need to imply that the transferences which thereby get expressed are themselves transient. Regarding the second point of possible confusion, let me note that I am not asserting that the shift to chaotic attractors that Priel and Schreiber write about (speculatively associated with transference) is a move that is in itself toward or away from health. Rather I believe in the possibility that individuals may come recurrently in and out of chaotic states (in a formal sense) and that these natural mindbrain system shifts in and out of chaos are what is likely connected with normality. In other words, the speculative shift to a chaotic attractor that Priel and Schreiber write about is not in itself connected with increasing pathology or normality. Pathology occurs, as I understand it, when the mindbrain operation becomes rigid or fixed in its operation, and normality is something analysis helps create by adding complexity and flexibility to mind/brain operations.

23 In the next section, I attempt to sort out what symmetry breaking means. Professor Arthur Springer of the University of California (Davis) has been of great help in helping me understand this subject. 98 Learning, Development, and Psychopathology in particular, it refers to deviations in the patterning of the flavor and mass in the expected
variety of subatomic particles (such as quarks, leptons, muons, etc.) (Thomas, 1995; Chivukula, Cohen, Lane, and Simmons, 1997). Within computer science, symmetry breaking refers to special creative techniques for finding algorithmic and other mathematical solutions to complex network problems (Awerbuch, Cowen, and Smith, 1994). In cognitive neuroscience, symmetry breaking relates to the effects within neural networks of creatively shifting the loading of input variables and system relationships. For instance, the orientations of visual cortical cell columns in the brain are said to be regulated by "symmetry breaking [which alters] cortical feedback connections" (Dong, 1997). It should be obvious that although none of these definitions of symmetry breaking is exactly the same, they nevertheless all share a common theme: the creation of qualitative change via reorganization. Finally, and most important for our discussion, within psychoanalysis we have the work of Matte-Blanco (1986, 1989), which deals with his own unique version of symmetry breaking. I believe Priel and Schreiber (1994) have this in mind without exactly saying so! Matte-Blanco (1986, 1989) has developed a self-consistent theory depicting the mind/brain's so-called biologic, by which he means that the unconscious mind's (primary process) logic is always in stark contrast with the (secondary process) logic of the conscious mind. In applying his theories Matte-Blanco systematically incorporates the idea of symmetry breaking to explain shifts between belief systems which are seen as symmetrical or asymmetrical, and on the other hand, which appear associated with steps in psychological development stimulated by psychoanalytic interventions of various kinds. An example will help quickly explain how symmetry breaking is used by Matte-Blanco. Wolf's earlier discussion of Franz Alexander's patient is actually quite similar to one Matte-Blanco (1989) discusses in detail from the perspective of symmetry breaking. Both these patients begin treatment in a stage in which their memories of their father have been kept relatively frozen. Under the influence of creative psychoanalytic intervention, however, a stage (of symmetry) is entered where each patient sees his analyst not merely as similar to but literally identical with his father imago (imbued with positive qualities). Next these patients move into a treatment stage that is symmetrical in a different sense: now they see themselves and their analyst/father as similar 25 (while retaining the 24 The late David N. Schramm, of the University of Chicago, made his major contribution in the area of connecting the cosmology of the so-called Big Bang and particle physics, primarily through his idea that there are only three families of
subatomic particles. Schramm based his assessment of the nature of the Big Bang at least partially on considerations of symmetry breaking.

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positive valence of both images). Finally, these patients move into a decisive asymmetrical stage (which coincides with symmetry breaking) in which they see themselves as persons separate from both their father and their analyst, while nevertheless retaining a feeling of positivity about themselves. Let us return briefly to Priel and Schreiber (1994), who quote Heisenberg (1971) as follows: "The same organizing forces that have created nature in all its forms, are responsible for the structure of the soul, and likewise, for our capacity to think" (p. 217). Their use of symmetry breaking, although not entirely unambiguous, relies on the work of Heisenberg (1971), of Nicolisi and Prigonine (1981, 1989), and I believe of Matte-Blanco (1986), as I noted earlier. Each of these investigators believe that how we think, feel, and behave derives from the variegated patterns of feedforward and feedback processes which alter the chaotic system we call our self, breaking new ground in creative acts. Such acts these investigators designate symmetry breaking, a term bathed in a rich network of associations of differentiation in various natural settings. Let me attempt to synthesize the various perspectives covered in this and the
previous section. It seems logical to conclude that there is likely such a thing in humans as optimal chaos. This optimal chaos would seem to involve the “free
dom” to form novel bifurcation points in one’s thinking, thus decisively orga
nizing and reorganizing mind/brain data bases (i.e., creating new connections,
ideas, affects, and memories). Such freedom could also be conceptualized as a
consequence of significant increments in the complexity in the nonlinear dy
namical systems we call mind/brain. In other words, the freedom to break sym
metry and operate with mind/brain systems on the edge of chaos (rather than
getting trapped in some rigid or fixed mind/brain systems) optimizes learning.
This is a novel explanation for psychological change compared with the usual
explanations (Shevrin, 1998).27

"A number of additional viewpoints could be applied to symmetry-breaking phases, as de
scribed by Matte-Blanco (1986): one would be Kohut’s so-called twinship (selfobject) transfer
ence; another the perspectives of various varieties of selfobject differentiation and/or individua
tion as in the theorizing of Margaret Mahler, Otto Kernberg, and Melanie Klein.

2. In Kohut’s self psychology this separateness would indicate a shift out of a selfobject trans
ference and into a self/libidinal-object transference.

27 Shevrin’s essay, while superficially describing why we
need consciousness, is really an essay that brilliantly describes how conscious mechanisms are the critical requirement for some learning which changes the vast nonconscious and unconscious parts of the mind/brain. Without such learning human progress would be impossible. It needs to be noted, however, that learning in no way requires consciousness; that a great deal of learning in life and in psychoanalysis is without conscious awareness. This essay on chaos theory is partly an attempt to get more precise about how various kinds of learning might occur. In another essay, written with Colwyn Trevarthen (this Annual), I make a further attempt to tie together loose ends of a psychoanalytic theory of learning. 100 Learning, Development, and Psychopathology Sashin and Callahan's Discovery: The Tunnel Let me conclude this essay by touching on two novel perspectives. The first and most important comes from the work of Sashin and Callahan (1990), who developed a double cusp model of the mind. Putting their mathematical model through its paces, they discovered an unexpected topological shape, which they called the tunnel, the observation of a phenomenon that I find compelling. Sashin and Callahan (1990) are properly content not to speculate overly about the significance of the topology they call the tunnel, a purely empirical mathematical observation. However, picking up on their own intuition, I wish to speculate that their "tunnel" might have a clinical correlation as follows: it could coincide with moments/circumstances 28 (as occur in every successful analysis) where the patient is finally able to feel the full intensity of private important affects, but where such emotion is now only modestly inclining the patient toward disruption (i.e., where the experiencing patient essentially feels safely able to contain feelings which were previously enormously disturbing). Sashin and Callahan's conclusion follows from the way their exact variable loadings in the model are controlled. Now the idea of a container function is not new to psychoanalysis. It has been noted by Bion (1967) and others. But the tunnel, conceived by Sashin and Callahan (1990) in space-time, is also the virtual space
where these two researchers conceptualize that mending occurs in the emotional container function. Most important here, the observation of a tunnel coinciding with an emotional container function is strictly an empirical finding which grew out of Sashin and Callahan's strictly mathematical analysis of affect responses to stressors in a chaos model within a 10-dimensional space. Clinical research is of course needed to confirm their findings. In terms of the earlier notation of symmetry breaking, the tunnel would appear to represent a decisive configuration in space-time which allows for creative kinds of information processing associated with "freedom" in the exact sense described by Utena (1996), whose work I discussed earlier. It is, of course, impossible to distinguish between whether this tunnel would represent the actual possibility of affect containment, or whether it is merely emblematic of the achievement of those circumstances that would make such a process possible. A 10-dimensional space merely means that the model involves 10 variables each, considered to represent an important spatial dimension. Current "string theory" and its derivative theories in physics employ the same idea of n-dimensionality, often imagining a world composed of the four usual dimensions (three spatial and one for time) plus added dimensions of a seemingly fanciful sort (i.e., as a mental construct), which are of course not "visible" to humans, but which are imaginable and have a theoretical validity nevertheless.

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Second, I wish to speculate further, based on an empirical correlation of my own. While writing this essay, I wondered if any independent general supportive evidence could be found that the higher cognitive functions in man reflect chaotic patterns. If certain chaotic states express higher mental functioning, might electroencephalogram (EEG) patterns associated with our higher mental functions show a precise relationship to Feigenbaum's constants? Duilio Giannitripani devoted himself to studying the EEG correlates of higher
cognitive functions. Most interestingly, his treatise of this subject shows that all the EEG frequencies associated with higher mental functions are themselves multiples of 3.5, something he calls Giannitripani’s rule of 3.5. Now you may recall that Feigenbaum's point (where chaos begins) is invariably 3.5699456 ... , which is of course approximately 3.5! Naturally, such a correlation might be irrelevant or accidental; to discover if it means anything deeper requires further research.

Summary

Chaos theory contributes a supremely useful terminology for and a way of thinking about development, learning, and psychopathology. In a nutshell, psychoanalysis invites learning by means of its effect on the hierarchical modes of the mind so that new levels of complexity are added to the ways these modes are actually utilized (i.e., instantiated in mind/brain). The consequence is that psycho pathology based on rigid or fixed mental functioning is reduced to a minimum, and instead new freedom of a biopsychosocial sort is created. In strict mathematical terms, freedom is a signal property of nonlinear deterministic systems when they operate on the edge of chaos and the edge of fixity or regularity. Through the terminology of chaos theory, we can better describe what we are observing clinically in terms of something more fundamental in nature. From
such a perspective, psychological development is merely one important example

of the chaotic normalcy of the world. And psychopathology, in contrast, is the

loss of freedom associated with fixity, when complex systems become too simple

30 A recent note from Howard Shevrin observes the following: "I presented a panel on subliminal evoked response potentials (ERPs) at the Society for Psychophysiological Research meetings.

Now subliminal ERPs look like noise to the naked eye, and ERP researchers like to see what ERPs look like. In order to show that subliminal ERPs have the same structure as supraliminal ERPs,

something that our statistical findings amply bore out, we multiplied the subliminal ERP plots by

a factor, thus 'blowing up' the subliminal ERPs and bringing them into the same amplitude range

as the supraliminal ERPs. The factor was four." In other words, the correlation of Giannitripani's rule to Feigenbaum's point may or may not be significant.

Howard Shevrin's remark to me, on my mentioning my so-called correlation, indicates the primitive state we are in regarding the applica

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and Row.


Nicolis, G. & Prigonine, I. (\ 981), Symmetry breaking and pattern selection in far from equilibrium systems. Proceedings a/the National Academy a/Science o/the U.S.A., 78:659-663.


Priel, B. & Schreiber, G. (1994), On psychoanalysis and


Subtle Is the Lord: The Relationship Between Consciousness, the Unconscious, and the Executive Control Network (ECN) of the Brain FRED M. LEVIN COLWYN TREVARTHEN All the life in the body is the life of the individual cells. There are thus millions upon millions of centres of life in each animal body. So what needs to be explained is ... unifying control, by reason of which we not only have unified behaviour, which can be observed by others, but also consciousness of a unified experience. -Alfred North Whitehead 

The conclusion of the first century of psychoanalytic work that may be of the greatest relevance for a theory of behavior regulation is the realization that a predictable series of regulatory modes succeed each other in the course of ontogenesis. These modes ... constitute an epigenetic sequence [such that] each mode persists as a potentiality throughout the life cycle and may be called upon whenever it offers the opportunity for optimal adaptation. -John E. Gedo

Gedo's developmental hierarchical model, which he and
Goldberg originated (Gedo and Goldberg, 1973) and he has continued to refine (Gedo, 1993), offers clinicians and researchers alike remarkable assistance in organizing their thinking about the patterns and mechanisms of mind/brain. Most interesting to this monograph, Gedo has employed his model to explore consciousness, a subject on the boundary between the psychological and the biological (1988, 1991a, 1991b). This essay was presented October 18, 1997 to The Fusion of Science, Art, and Humanism: The

FRED M. LEVIN AND COLWYN TREVARTHEN 107 Consciousness and the Community of Others

It will help to place consciousness in social context. Imaginative consciousness takes place in a community of understanding (Vygotsky, 1956; Wittgenstein, 1953; Trevarthen, 1990). Although we are individuals and analysis investigates our uniqueness, we are happily or unhappily part of a nexus of intersubjective relationships that shape, value, and add meaning to our lives. Intersubjective relationships play an important role in the early development of our self-confidence, knowledge, and skills throughout our development.

Somehow this consciousness with others depends on the way we pursue purposes in awareness, and with feelings. Our conscious perceptions are not passively received, but rather the results of active searches for particular experi
ence. Sharing conscious experience is also a primary human motivation. Planned actions are themselves motivated and guided by specific conscious motor images, in which neuroscience has long been interested, but that are still at the margins of psychological theory (Sperry, 1950, 1952; Ingvar, 1994; Jeannerod, 1994). In spite of limited knowledge, as Posner puts it now, there is "surprising evidence for . . . [an ECN] involved in a wide range of tasks . . . as different as detecting visual targets, controlling verbal working memory, noting errors, generating associations and resisting conflict. . . . All [show] activity within a strip of tissue along the central midline, mostly within the anterior cingulate gyrus" (Posner, 1996, p. 82). Posner is attempting to identify a nexus in mind/brain networks where intentions enhance experience by way of selective attention. An interesting, and possibly novel, characteristic of the human variety of conscious experience is that we are ordinarily capable of tracking multiple trains of thought simultaneously, generating polyrhythms of purpose and experience, with branching or overlapping chains of foci for consciousness. Freud's early theorizing (1910) revolves around the coexistence of antithetical thoughts, a necessary basis for any conflict psychology. Less well known, however, is evi
dence that such parallel processing starts early in life (Trevarthen, 1997). Mul
tiple tracks of awareness and thinking are products of a
mind that has gained

freedom through gestures, narrative mimesis, and language. Especially helpful are Posner and Rothbart's efforts summarizing their data

on the onset of the appearance of attentional control. Very young infants have simpler and less reliable strategies for orienting their awareness, whereas a year or so later in life aspects of attention such as conflict and error detection in children, which are more clearly related to confident executive control, can be measured (Posner, 1997, personal communication). More fascinating still is evidence that the patterning of our mental life with each other is largely genetically constrained, although environmentally released.

Inner genetic blueprints and epigenetic schedules for a purposeful and conscious life sympathetic to the motives of others such as ourselves start unfolding before birth in embryo and fetus, and continue to express themselves throughout the 108 Subtle Is the Lord life cycle. This programming includes the expectable stages in Gedo and Goldberg's (1973) hierarchical developmental model. For example, a trait as basic as our inclination to imitate each other, and the complementary pleasure in being imitated, are inborn capacities we can manifest within hours of birth. Baby and Mother-Two Consciousnesses Resonating as One Communication between mother and baby starts, for the mother, at the very least any time after the awareness that conception has occurred. It culminates in Winnicott's primary maternal preoccupation. We do not know exactly when baby actively joins in the real dialogue, but evidence supports the view that some form of embryonic consciousness and sympathetic response to the mother's messages actually starts before birth through the baby's listening to sounds of the
mother's voice and its awareness of her movements and such other sensations as her touch. There are also the baby's responses in the form of movements which the mother can detect, thus locking the two into an early motor dialogue. Shortly after birth the newborn can be ready to engage in "proto-conversations" with its mother and to imitate mother's facial expressions and hand movements, something that could not possibly have been learned (Trevarthen, 1989, 1995). A newborn baby, whose heartbeat accelerates with excitement when imitating, can voluntarily give back the imitated gesture to "provoke" a reply from a watching and waiting partner; the baby's heart slows as a response is expected (Nagy and Molnar, 1994). Both mother and infant actively choose to engage in such intersubjective experiences, whereas over time the baby's semiotic repertoire extends from first messages communicated via affects in gestures and concrete signals directed toward objects and events, to verbal interchange, which gradually acquires a grammatically coded syntax, and ultimately to the creation and communication of shared representational and motivated narratives (Levin, 1991; Gedo, 1996, p. 95). The felt sense of a conscious, autonomous self thus clearly builds through modes or stages in intimate companionship with the states of other minds. Various kinds of mapping of diverse fields of reality also occur in the baby over time. The baby explores his or her body parts and their relationship to each other, locates purposes in a personal space, and can fill this with real, concrete experiences of intentional looking, reaching to touch, or listening; all such sensory experiences map the baby's self-conscious place in a community of human relationships, identifying individuals as family or strangers. Cultures define normative expectations for role relationships, ambitions, and values, which are themselves gradually internalized and recognized by the newborn, but the generation of this learning is within the social curiosity of the infant (i.e., an innate intersubjectivity). The baby's intuition for human life is matched by the mother's willing offer of expressive play and concern for both

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the physical and mental aspects of life. When the time is right to communicate

with and interpret her willing infant, a happy mother does not even need to learn

motherese from her culture--she is born with an intuitive fluency of vocal ex
pression for conversation, offered with appropriate feeling and richly embellished by gestures and postures, and she uses it (Trevarthen, 1989, 1997). The voices and movements of mother and baby are continuously alive with feelings, and even with their later use of grammatical language, the very sounds and movements of mouth, tongue, and lips often continue to imitate the meanings intended, as noted by Fénagy (1971, 1987). For example, the speaker who is angry, in almost every language, throttles his threats and curses! And affectionate words like "kiss" veritably ooze with sentiment. This human skill for representation of meaning in bodily gesture and "tone" of movement has been called "mimesis" by Donald (1991), who considers it the indispensable phylogenetic precursor of language (see also Levin, 1991). Sympathetic consciousness of emotions identifies what is salient for learning (Levin, 1991, 1997a, 1997b) for establishing goals and values, as well as for consolidating interpersonal bonds (Trevarthen, 1979, 1993). Writing from an evolutionary perspective, Langer (1967, p. 444) notes that "value exists only where there is [a shared sense of] consciousness. Where nothing is [consciously] felt, nothing matters." Consciousness is equated with feeling, which can only mean that it derives from purposes. Shared emotions and values enable us to
better understand each other as individuals and as members of a particular family, societal group, and culture. Engagement with others neatly doubles, as well, as a prototype for internal organization of thoughts in the conversational mode (Vygotsky, 1956; Wittgenstein, 1953), as well as for the evolution of a defined, cohesive, and autonomous sense of self (Winnicott, 1969; Kohut, 1971; Gedo, 1993). But what really does this rich, varied, and fundamentally innate consciousness in companionship consist of in terms of mind/brain? In what follows we elaborate on bottom-up, then top-down theorizing. Where appropriate we offer speculations toward further understanding Gedo’s three traumatized patients. Neuropsychological Studies of Consciousness: The Bottom-Up

"The bottom-up approach ... looks at the physiological components and infers from a knowledge of them how the whole system must work" (Crook, 1988, p. 350). To understand consciousness in bottom-up terms, hypothesizing motivational mechanisms, Posner and his collaborators focus on selective attention within the visual system, which we briefly review here. They identify anterior and posterior attentional systems that show significantly different characteristics (Posner, 1988, 1994, 1995; Bechtereva, Medvedev, and Abdulaev, 1992;
Subtle Is the Lord The anterior attention system (composed of anterior cingulate gyrus and basal ganglia) serves executive functions and is involved in attentional recruitment and control of brain areas to perform complex cognitive tasks; the posterior attention system (composed of superior parietal cortex, pulvinar and superior colliculus) is largely responsible for selecting one stimulus location among many and for shifting from one stimulus to the next [Stablum, Mogentale and Umilta, 1996, p. 263]. Dehaene, Posner, and Tucker (1994) have also confirmed the importance of the anterior cingulate cortex in monitoring performance and compensating for errors, what they call attention for action (p. 304). The picture that emerges is that of different modules involved in decisions, target selection, zooming in, and detaching from objects of interest (Posner and Raichle, 1994). Damage to the ECN provides information about mind/brain correlations. For example, damage to the anterior cingulate disturbs the entire array of ECN functions, including such activities (of psychoanalytic interest) as error correction, associating, and dealing with conflicts (Posner, 1996). In PTSD the anterior cingulate (along with amygdalar circuits) has been shown to “playa role in the pathological response of combat veterans ... to mental images of combat-related scenes” but not in the responses of control subjects to the same stimuli (Shin et al., 1997). In autism and the related condition Asperger’s syndrome, decreased metabolic activity has been found in the cingulate gyrus on PET scan (Minshew, 1992, cited in Aronowitz et al., 1997). As Posner indicates, establishing ties between the PET work on infants and various kinds of developmental pathology would be extremely important for understanding mind/brain mechanisms (Posner, 1997, personal communication). In contrast to the case of damage to the anterior attentional system, damage to the parietal lobe (part of the posterior attention system) typically interferes with the ability to detach gaze from objects of interest (Posner, 1996). Thus, although we cannot be certain, it seems unlikely that the posterior attentional system plays any role in the problems of Gedo’s traumatized patients. More likely, the clouding of their consciousness relates to traumatically induced changes in either the anterior portion of the ECN, its “extensions” (which we will describe), or the system relationships between the ECN and its “extensions.” Posner et al. ’s research has stimulated detailed investigation of various aspects of control of the visual and other sensory systems (Posner et al., 1992; Mattingly, Davis, and Driver, 1997; Rees, Frackowiak, and Firth, 1997). Visual control bears a clear
relationship to our subjective experience of awareness because the anterior cingulate activates when subjects detect visual targets and is quiescent when thoughts are cleared (Posner and Raichle, 1994, pp. 178-179). The research of Posner and his colleagues has also spawned clinical tests for identifying and even quantifying subtle but significant evidence of closed head injury to the ECN, based on performance on visual tracking paradigms (Stabulum et al., 1996). Such examination of Gede’s three analysands could effectively identify covert neurological injury and further localize which portion of the attentional system is involved. The ECN’s Extensions 1

Taking stock briefly, we are suggesting that the ECN includes a core and a variety of ECN extensions. The core structures are the anterior cingulate, basal ganglia, posterior parietal cortex, pulvinar, and superior colliculus. The extensions are the reticular activating system (RAS), orbital frontal and selective other cortex, the amygdalar and hippocampal systems, corpus callosum, and cerebellum. We begin with the RAS and the orbital frontal cortex. The RAS plays a well-known role in general arousal (see Levin, 1991). The orbital frontal cortex acts to inhibit, and sometimes produce amnesia for, impulsive and dangerous behavior. For example, tumors in this area can produce homicidal acts carried out without apparent conscious control (Relkin et al., 1996; Damasio et al., 1994).

Hadley (1997) extensively discusses the orbital frontal
cortex from the perspective of Schore's (1994) study of self and brain. Schore speculates that during development in an optimal human environment, dopadrenergic midbrain neurons migrate upwards and forwards into the orbitalfrontal cortex, contributing decisively to self regulation (Schore, 1994; Pally, 1997). We may ask if this migration is part of what early PTSD alters. Later we note other effects of PTSD on the brain. The next extension is the lateral prefrontal cortex, which "appear[s] to hold the relevant information [for conscious tasks] on-line" for the cingulate cortex (Posner, 1994, p. 7401), "a process known as working memory," a function currently without absolutely agreed upon boundaries (Rao, Rainer, and Miller, 1997, p. 821; Baddeley, 1986). The cerebellum, which we are considering an ECN extension, influences a variety of sensory, motor, attentional, and cognitive systems "in order to accomplish its prime function which is to learn to predict and prepare for imminent information acquisition, analysis, and action" (Allen et al., 1997, p. 1942; Levin, 1991; Levin and Vuckovich, 1983). In this way, "through its connections with attentional systems [the cerebellum] influences the speed and accuracy of ... attentional changes" (Allen et al., 1997, p. 1943; also see Trevarthen, 1990,
p.54). I Those familiar with the ECN extensions may wish to jump to the following section. II Subtle Is the Lord Consider also as ECN extension the amygdalar and hippocampal systems. II As noted earlier in this essay, the hippocampus is responsible for creating and modifying the data bases of mind/brain (Palombo, 1998). In a separate study of selective focal hippocampal damage early in life (Varghahadem et al., 1997), there is evidence that although episodic and semantic memory seem at least partially dissociable, "only the episodic component seems fully dependent upon the hippocampus" (p. 376), which fits with the work of the Damasio group already noted. Incidentally, such hippocampal damage is known to occur in PTSD secondary to the effect of stress-related chronically high blood levels of corticosteroids, and has been correlated with the patient’s difficulty, once this condition begins, in properly analyzing stress and choosing adaptive responses to it. Instead the subject reacts in a uniformly reflexive manner (van der Kolk, 1997). Returning to Gedo's three traumatized patients, it seems that although psychoanalysis could be used to attempt to understand what these subjects originally experienced, and thus eventually acquire knowledge of the circumstances of their trauma, this might be difficult precisely because any association or recollection within such treatment would itself depend to some degree on the function of damaged hippocampuses (the organizers of mind/brain data bases)! This is, in fact, why skilled analysts do not rely entirely on the patient’s associations or memories to come to various conclusions, but also examine carefully their (transferenceential) affective and behavioral patterns in the treatment situation. Comissurotomy The final ECN extension is the corpus callosum, which interconnects the hemispheres and is itself associative cortex. This subject is sufficiently convoluted II As an aside, the amygdalar and hippocampal systems show an interesting double dissociation effecting consciousness that has been identified by Damasio's group at Iowa (Bechara et al., 1995). Specifically, bilateral damage to the amygdala prevents learning aversive responses, yet allows one to nevertheless learn the special circumstances associated with the appearance of pain (i.e., it damages semantic memory). In contrast, bilateral hippocampal damage allows aversive response learning to proceed normally but interferes with learning the associated specific circumstances (i.e., it damages episodic memory). This dissociation is what leads Hadley (1997) to call the hippocampal module a system for belief (we prefer concern) and the amygdalar module a system for knowledge. You might wish to think of the amygdala, also, as the fast
circuit for reporting emergencies to higher centers, for rapid response. J Levin and Vuckovich (1983) have speculated that psychoanalysis is perfectly designed to accomplish such a task, as, for example, when we overcome so-called horizontal and vertical splits in the ego (conditions that they conceptualize as disavowal, i.e., right-to-left and repression, i.e., left-to-right interhemispheric communication blocks).

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...that it is best considered in a separate section. The psychological effects of callosal transection have been studied extensively (Sperry and Zaidel, 1977; Trevarthen, 1975, 1979, 1990). Commissurotomy, in "test" circumstances where deployment of purposes and attentions is constrained, "detaches the two cortical memory stores so they operate as independent associative systems" (Trevarthen, 1990, p. 74).

Commissurotomy, usually done to stop otherwise uncontrollable epilepsy, can cause abnormally unstable attention and lead to fluctuating neglect, loss of vigilance, unconstrained perceptual completion of image building, mutism, and transient apraxias. However, perhaps unexpectedly, commissurotomy patients are not as troubled as normals are when presented with conflicting perceptual tasks.

In fact, under such circumstances they actually show enhanced perceptual processing in the sense of readily holding within perception completely incompatible data sets!
Let us linger here to observe that the neurological concept of separate (in compatible) consciousesses in split-brain patients overlaps the Freudian concept of incompatible ideas coexisting within the normal mind. Our reading, from an interdisciplinary perspective, is that in this isomorphism we catch a glimpse of some critical design features of the normal human brain. If under ordinary circumstances two or more separate and distinct consciousesses can occur in one mind, as Freud noted, and as split-brain subjects readily demonstrate, then this can only mean that the mind often behaves as if a true integration of incompatibilities exists when this infact is not the case (Bogen, 1990; Trevarthen, 1990; see also Rao, Rainer, and Miller, 1997, for an interesting example of research on the integration of sensory data in the prefrontal cortex). But how and for what reason is the appearance of integration accomplished, from either an experience near or distant perspective?

One way would be for frequent control decisions made by the mind/brain in order to switch mental processing between low-level, routine, automatic attentional mechanisms (which might potentially get us into trouble by inviting awareness of incompatible impulses, thoughts, and feelings) and high-level, se
lective, attentional mechanisms (which would have the capacity to mix and match the complex machinery of mind/brain in ways that safeguard mental life). We are of course describing here the well-known psychological defense mechanisms used by the mind/brain to deal with conflict or its mere appearance. We also are describing what would appear to be a known operation of the ECN.

We are arguing, on a logical basis, that the very same control structures of the mind/brain that create consciousness also create the dynamic unconscious. Thus, the anterior cingulate cortex, by making high-level decisions to selectively expand or shrink the ECN (by including or excluding extensions from the neural network), is using its capacity for selectivity of attention (i.e., consciousness) to protect unconscious thoughts, goals, and aims. For example, by eliminating or at least dampening cerebellar input to the ECN temporarily, the anterior cingulate could render "invisible" evidences of discrepancies between real and expected input, the kind of discrepancies that would otherwise invite awareness of unconscious motives. Later, when the ECN estimates that such discrepancies can be dealt with effectively, the cerebellar "gating" would be halted. If we now switch back from a psychoanalytic to a cognitive neuroscience perspective, there is good evidence accumulating that the coordination of the different viewpoints of the two cerebral hemispheres ordinarily falls to the ECN and its "extensions" as a group. This has been examined exhaustively by Shallice (1998), and is covered in the next section. The bottom line, however, is that "consciousness in the hemispheres may be profoundly changed by lateralized activation of the cortex. Such 'metacontrol' can further lead to poor cognitive performance ... [for example] if allocation of activity is to a hemisphere ill-equipped for a given task" (Trevarthen,
Our idea coincides with a new essay of Opatow (1998) cited by Shevrin (1998). Opatow begins with imagining the situation of the infant that Freud discusses. Hallucinatory wish fulfillment. Assume the infant has fed at mother’s breast, and is now imagining doing so again, that is, hallucinating (imagining) the breast. He or she is feeling hungry, yet associating to the source of food, softness, and comfort in the arms of mother. However, the pleasure in the imagery of being at mother’s breast does not satisfy, that is, it is not the same as really being there, and it also does not last. After a period of time, frustration ensues, and the familiar distress signals begin which signal the mother to the infant’s need to have an actual feeding. However, if these cycles are repeated sufficiently, Opatow argues, at some point a momentous decision is made by the infant developmentally who “negates the entire mental mode of hallucinating (imagining) wish fulfillment, not simply individual instances of doing so,” and, as Opatow puts it (cited by Shevrin) “at this juncture both consciousness and the unconscious are born” (Shevrin, 1998, p. 75). The unconscious thus begins as a mental set associated with the negation of the mode of hallucinated wish fulfillment, yet still guided by what Freud called the pleasure principle. In contrast, consciousness continues under what Freud called the reality principle. Opatow states clearly, however, and this seems correct clinically, that these two mental domains are not clearly demarcated, and thus remain mixed to partial degrees forever, with unconscious elements continually influencing behavior via transference, especially when wishes are at variance with reality “and the ability to obtain current appropriate satisfaction is impaired” (Shevrin, 1998, p. 75), and where conscious events or subliminally perceived events influence the unconscious. In our opinion (following Posner, and especially Shallice), the developing young mind operates with a hovering attention, and so long as ordinary wishes become satisfied without difficult delays, it operates using fairly low level reflex type attentional mechanisms. However, as a consequence of significant (excessive) frustration, there begins to occur a decisive shift: The infant becomes capable of shifting the attentional system from low-level contingency planning to high level executive control, something it accomplishes by briefly expanding the executive control network. At this moment, what comes into existence is the distinction between consciousness, and the unconscious, because the infant’s problems of matching inner needs with outer realities requires consciousness for its capacity to take reality into account, and the unconscious to properly reflect and protect wishes and
needs. Clearly, conflicts of all sorts are a continuing possibility, and require an adaptive repertoire fulfilled by all subsequent personality development.

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Incidentally, the term metacontrol was coined by Jerre Levy and Colwyn Trevarthen (1976), and derives from experimental data that suggest activity of a supervisory system or ECN whose decisions essentially match hemisphere with current cognitive task. Clearly, in the present discussion we are extending the meaning of metacontrol significantly to include a defensive/adaptive function (namely, protecting the self or other from seeing and/or experiencing evidence of internal conflict).

As noted, Posner et al.'s research assigns metacontrol to the anterior cingulate gyrus, which issues orders to executive control modules within the prefrontal cortex, basal ganglia, corpus callosum and/or cerebellum to take over, in various combinations and permutations, thus optimizing information processing for a given situation (Levin, 1991; Rees et al., 1997; Trevarthen, 1990). Such higher-level special handling, as it were, requires consciousness control (or, at least, monitoring) of vast amounts of information. The need for special handling makes consciousness a critical design feature of mind/brain.
Let us reconsider Gedo's patients in light of these considerations. It is possible that during and after traumatic overload states (i.e., as a consequence), metacontrol is what actually becomes disrupted, so that these patients end up matching various cognitive tasks to the wrong cognitive module, that is, one not well suited for the task at hand. This might show up as momentary confusional states of altered consciousness as the self discovers unanticipated difficulty in task completion. Anxiety and quick responses without forethought would be an expected feature of such difficulty.

To summarize, we are proposing that collosal transection eliminates the highest hierarchical level of commissural linkage, the one "providing flexible choice of behavioral sets and orientations" (Trevarthen, 1990, p. 77). Normally at times of complex problem solving, high risks befall the mind/brain when the ECN is dependent on routine, low-level, inflexible, contingency planning rather than high-level, flexible, organizing principles. The anterior cingulate itself apparently tracks ongoing system events, creates and deploys focal attention to actively search for needed data, and most importantly, recruits and coordinates more of the mind/brain's controlling machinery when demanded by novelty, dif
ficulty, or the importance of the task at hand. 5

5 Recent research by Usher et al. (1999) indicates that the locus coeruleus (LC) may also play a
role in attentional shifts "in exploratory behavior and responsiveness to novelty" (Footnote 27, p.
554). By this means the LC "may mediate shifts between [these modes]" (ibid.). It is difficult to
know, however, if such shifts (in novelty) are really comparable to the kind of shifts discussed
earlier (in relation to difficulty and novelty). It appears, nevertheless, that considerable redun
dancy is built in to the mindbrain, so the multiple structures noted may be performing essentially

the same function or at least complementing each other in the operation of the ECN. 116 Subtle Is the Lord
Top-Down Approaches to Consciousness: The Functions of Consciousness Top-down "means looking at the design
features of elaborate performance and then inferring the sorts of components that could process the performance" (Crook, 1988, p. 350). Shallice (1988) has inferred much about how the mind/brain works from his review of such partially functional states as so-called blind sight, knowledge without awareness, and dual consciousness in the split brain. His conclusions are much the same as our own. According to Shall ice, consciousness is essentially an emergent property of four interactive neural control systems-what he calls the overall supervisory system (which employs consciousness to monitor external and internal states and determines special handling for high priority mental operations), the language system (which responds to wordlinked triggers with shifts in mental set), contention scheduling (which controls patterns for the more usual and customary low level operations), and episodic memory (which contributes its vast store of personal associations to cognitive processing). As noted earlier, some of the same research has been described under the rubric of "working memory." Employing the perspective of Shall ice, Gedo's three analysands with disturbed consciousness suffer from knowledge without awareness. The problem analytically is how to begin to help them identify that there exists significant episodic, that is, procedural memory (of trauma), which they are not conscious of possessing. Although most often this insight is
accomplished in analysis by interpreting transferences, in
the case of these patients, it may be more crucial
sometimes for the psychoanalyst to recognize that a
significant portion of the patient’s important affective
intensity seems not transferential at all! In somewhat
different words, in Gedo’s patients we meet an instance
where it would be easy to conflate the cognitive
nonconscious with the Freudian unconscious. Shevrin (1992)
reasons that for the rapid retrieval of brain data bases
to work, the different varieties of experience must have
been properly distinguished from each other in memory.
With this aim in mind Shevrin believes that consciousness
functions principally to tag (categorize) experience
according to whether it is the recollection of a
perception, a sensation, a dream, a thought, a wish, and
so on. His own empirical research (Shevrin et al., 1996),
distinguishing analytic and electroencephalographic
markers of unconscious versus conscious events, has lead
him to this viewpoint. In other words, if one believes in
a dynamic unconscious, it follows that some experiences
are known and categorized by one system (say the system
conscious) but not by the other (say the unconscious
system). It is a short step from this thought to
recognizing that even within a single system retrieval
might well require a categorization tag to distinguish the
various types of experiential memories from each other. 6
See Tranel and Damasio, 1985.

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Shevrin’s perspective appears in the neuropsychological
literature under the
rubric of procedural/implicit versus semantic/explicit
memory. Posner and
Rothbart (1994, pp. 48--49) tie the neurology and
psychology of consciousness
together when they describe, in the case of the anterior
attentional system, how
explicit learning is blocked by distraction whereas, in the
posterior attentional
system, implicit learning cannot be so easily blocked. 7
Why is this important?

The importance of such work on learning dissociation is as
follows: within
the first four months of life, and certainly by one year, infants learn who and
what to attend to, and this relatively nondistractible, procedural kind of learning
helps them with all further learning by focusing them on information their culture values (Posner and Raichle, 1994). The work on dissociation also helps us appreciate the complexity of the problem of our understanding circumstances where our patients know things they are not aware of knowing; that is, our subtle Lord has created, in mind/brains, multiple memory systems with an adaptive redundancy that staggers the imagination, and sometimes runs amok. 8 For example, using Shevrin’s insights one must conclude that Gedo’s patients have, through their early trauma, failed to properly tag or categorize critical memories, thus interfering with memory retrieval. When experiences without tags necessarily manifest themselves (primed by experiences in the here and now), their confusing origin and unexpected nature cannot fail to tip such individuals into a temporary clouding, or a fragmentation of consciousness. These disturbed states express the patient’s painful objectless confusion; they also serve as markers of the trauma and history of the deployment of primitive protection against pain by means of the mechanism of nonregistration.
Olds (1992), in company with many cognitive scientists, sees the brain primarily as an information-processing machine. Reasoning from Shannon’s information theory that any information system tends to degrade, Olds believes the key function of consciousness must be to prevent information degradation. Olds is supported by the generator-in-randomness thinking of Rosenblatt and Thickstun (1994), Edelman (1989), Margolis (1987), and the late Michael Basch (1976).

Applied to the example of Gedo’s patients, Olds’s reasoning seems as follows:

One can imagine that as the patient’s awareness of the true significance of their episodes of disturbed consciousness grows in treatment, the patient will attempt to hold on to this new, now correctly labeled and valued information by repeatedly

7 However, this dissociability seems not to be the same dissociability that we noted earlier regarding the amygdalar and hippocampal systems. Rather here, explicit learning is being localized anatomically within the ECN whereas procedural (i.e., implicit) learning is given no such localization.

S The title of our essay makes an allusion to Einstein who is known to have noted how subtle is the Lord, whenever he confronted problems that were, in his opinion, of the highest level of difficulty. It is our belief that the current subject, conscious-unconscious relationships, qualifies
as a problem of such supreme difficulty. 118 Subtle Is the Lord feeding his partial insights into various memory systems. However, in the process the patient will generate a number of duplicate memories, each with somewhat different tags, producing some further temporary confusion at times that will ultimately lead to improved retrieval and a basic reorganization around the reclassification of memory tags (which includes the category, not categorized yet!). Attention requires instructions from the prefrontal cortex, that part of the brain most often connected with working memory (Crick and Koch, 1992; also see Barinaga, 1997). Gedo’s patients necessarily activate their working memories in order to expand their knowledge because it is only within working memory that memories become capable of reinterpretation by the self. Based on the research of Posner (1995) and Lassen (1994), Levin (1997a, 1997b) suggests that one reason engaging the transference is often crucial for psychoanalytic learning is that the free association and spontaneity associated with transferences activate specific blocks of working memory, thus facilitating learning. The philosopher Searle (1995) raises thoughtful philosophical objections to the various propositions of top-down theorists. However, the downside of his own efforts is that along with Eccles (1973) Searle believes consciousness to be fundamentally mysterious, by which he means unknowable. This, of course, puts consciousness research outside the reach of science, but safely within the bounds of philosophy. Additionally, Eccles asserts that only the left hemisphere has consciousness! We believe with Sperry and Zaidel (1977) that a more plausible and parsimonious conclusion would be that both hemispheres are capable of consciousness, but that the left hemisphere particularly communicates its experience in words whereas the right hemispheric output is nonverbal and thus often ignored (especially by the left). Finally, we mention Csikszentmihalyi’s (1975) proposal that one phase of conscious experience (not further specified neurophysiologically) is associated with relaxation, joy, energy, and self-confirmation, something he colorfully denotes as flow (see also Crook, 1988, p. 355) and something that we would locate more with the right hemisphere (Damasio et al., 1994; Schore, 1994). Csikszentmihalyi (1975) believes that disrupted flow interferes with consciousness, that is, consciousness is the experiential aspect of successful ECN activity. If optimal ECN functioning coincides with pleasurable feelings of self cohesion, intentionality, autonomy, and protected privacy, then nonoptimal ECN activity coincides with temporary disruptions of consciousness and secondary
disturbances in mood (including shame). Synthesis and
Summary We have discussed consciousness and its
relationship to the ECN, suggesting that the set
of functions of the anterior cingulate gyrus shows a key
relationship

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to both conscious and unconscious processing. In doing so
we appreciate that

we run a risk of confusing some readers by appearing to
confound the cognitive

nonconscious with the Freudian unconscious. From our
perspective, however,

the are clearly related but different domains which
require a separate treatment. What follows summarizes our
discussion of consciousness, the ECN, and our

various speculations about Gedo’s clinical experience
with those rare analysands

who suffer disturbances of consciousness. Although no
consensus exists, Levin (1997 a, 1997 c) believes that
there are

significant areas of agreement about the likely functions
of consciousness. At

the lowest level of brain activity, memories are in all
likelihood categorized,

stored, and maintained by both conscious and nonconscious
means. This re

sembles what for computers is the dumping of old cache
files, performing other

cleanup and editing, and otherwise making room for new
information while

maintaining old information in a retrievable format. It
makes sense that the con

scious component of this level of control is for the
purpose of categorization,

just as Shevrin (1992) posits, so the data bases of
mind/brain are usable on-line. At an intermediate level consciousness is allowed to fluctuate in a never-ending dialectic between the brain’s purposeful search for specific goal-related input and the priming effects of input on the brain’s goal system. Levin and Kent’s (1995) cybernetic model of the brain accounts for such activities and requires an ECN with two inputs: goal priorities and feedback about motor output and current states. Kent’s model seems closest to “attention for action” (Dehaene et al., 1994, p. 304). Finally, at the highest level of organization conscious mechanisms appear to prevail as the sine qua non for the on-line functioning of human hypercomplexity.

Hypercomplex functions require networks which expand according to the scope of the task, rapid access to the most sophisticated data bases of mind/brain, and a subtle kind of decision making that only consciousness of the human variety has evolved to accomplish. Starting with the work of Gedo, we have examined how trauma early in life can result in PTSD with decisive changes in cognitive development, error correction, association of memory (organization of mind/brain data bases), and management of conflicts. Along with many other kinds of interventions, psychoanalysis is then needed to restore normal functioning (Pally, 1997; van der Kolk, 1997). A logical corollary seems to be that normal ECN functioning results in a quality
of individual consciousness which, when shared with others, becomes a decisive part of the glue in relationships in general. In the end, of course, consciousness of community and optimal emotional and cognitive development influence each other (Levin, 1991). We thus offer the following set of explanations for the fluctuations in con

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Eccles, J. (1973), The Understanding of the Brain. New


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van der Kolk, B. A. (1997), The psychobiology of post...


This essay does not conclude with a definitive answer to the question raised in its title; it is more of an exploration of the question, Are mental functions hierarchical? What I present is part of a continuing dialogue with John Gedo. As he probably recognizes from my review of his books over the years, I have had some reservations regarding the concept of hierarchy as applied to the model of the mind. I have had the intuitive sense that mental functions may not be ordered hierarchically. Or, if they would be hierarchical, then what exactly this means needs elaboration. However, one's critical faculties must rest on something more than intuition, so this essay also represents a dialogue with myself, an attempt to
uncover why the concept of hierarchy troubles me when it is applied to mental functions. At the outset it should be stated that in our contemporary, highly pluralistic, conceptually divided, psychoanalytic culture, John Gedo and I share very basic values. We both believe that psychoanalysis is biologically rooted, but in addition we believe that the biology of psychoanalysis should be brought up to date. That is to say, it should be consistent with what is known of the functioning of the brain at the end of the twentieth century. It would be a depreciation of Freud's achievement to do anything less. We also share another basic value—we have never shied away from treating disturbed and disturbing patients psychoanalytically. Those of us who have had this experience will think differently about psychoanalysis; it is an antidote to any tendency toward preciousness. Hierarchical concepts pervade biological thinking. Biology encompasses a multitude of hierarchical levels, including macromolecules, genes, cells, tissues, organs, individuals, population dynamics, and so forth. Indeed the eminent evolu

ationist Ernst Mayr (1997) notes that it is the hierarchical organization of living systems that clearly differentiates the animate from the inanimate. He observes that these hierarchically ordered systems with many emergent properties are never
found in inanimate matter. The term hierarchy is of course a metaphor, and it is of religious origin. According to the literary critic Harold Bloom (1996) the word hierarchy was invented by a fifth or sixth-century neoplatonist, who called himself Dionysius. As is true today, the term hierarchy was used as a means of forming categories. However, the items that were so categorized were not biological elements, but angels. Dionysius categorized nine orders of angels, in groups of three, from higher to lower ranks. The concept of hierarchy was placed in an evolutionary context and applied to mental functions by the social evolutionist Herbert Spencer and the neurologist J. Hughlings Jackson. Jackson shared with Freud a penchant for broad biological theorizing, and Freud (1891) acknowledges that he was significantly influenced by his ideas. Stanley Jackson (1969), a historian of psychiatry, traced the collaboration between J. Hughlings Jackson and his friend Spencer. J. Hughlings Jackson's evolutionary theory seems more Spencerian than Darwinian. Spencer introduced the idea that there is always some disintegrative activity in any integrative process and vice versa. Stanley Jackson observed that the notion of disintegration, a reversal of coherence, may have been prompted by the fact that both Spencer and J. Hughlings Jackson suffered from certain unspecified nervous disorders. A nervous disorder was seen as an example of a disintegrative activity. Spencer further believed that each step in mental evolution results in a faculty by which simpler preexisting faculties have their respective actions so combined that each aids in regulating or controlling the others, and the actions of all are harmonized. Incidentally, Stanley Jackson believes that Freud's concept of regression was in part derived from J. Hughlings Jackson's hierarchical theory. J. Hughlings Jackson applied these Spencerian ideas to the function of the central nervous system with the implicit assumption that nervous centers were ordered on a developmental continuum from the lowest reflex center to the highest center of voluntary control. In addition to this developmental ordering, there is also a phylogenetic ordering in the central nervous system from the oldest premammalian structures to the most recently acquired. J. Hughlings Jackson claimed that when one ascends this hierarchy one moves from the most organized to the least organized. I find the term organization misleading. I believe what Jackson was referring to was an involuntary/voluntary axis; reflexes are involuntary whereas higher functions are volitional. A reflex system could be said to be organized in that reflexes are fixed.
as compared with the unlimited potential of voluntary action. In addition, as one ascends this neurological hierarchy, one moves from the simple to the complex. In disease processes, Jackson believed, the most recent evolved functions would be effected earlier than older, more primitive functions. Jackson's hierarchical theory was not intended to merely establish descriptive categories, for it also attempted to explain the functional interrelationships between different hierarchical levels. Jackson may have been giving voice to the

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prevalent idea of biologic development at the time, namely, that any stage in development is in part controlled by the previous stages (Mayr, 1997, p. 172).

J. Hughlings Jackson states: "the higher nervous arrangements evolved out of the lower keep down those lower, just as a government evolved out of a nation controls as well as directs that nation." One immediately recognizes that this formulation has had a pervasive influence on psychoanalytic theorizing. Freud's structural theory contains similar phylogenetic and developmental assumptions:

the phylogenetically primitive id is controlled by the evolutionary more advanced ego and superego.

In his recent book Hierarchical Concepts in Psychoanalysis written with Arnold Wilson, John Gedo (Wilson and Gedo, 1992) recounts how he and Arnold Goldberg came to formulate their hierarchical Models of the Mind. He acknowleded that he was influenced by David Rapaport's magisterial contribution.
The Organization and Pathology of Thought (Rapaport, 1951). There he "en countered Rapaport's insistence that developmental psychology must be under stood as an epigenetic sequence organized in a hierarchical manner." In turning to this text, I discovered that Rapaport's theory of thinking repeated Jackson's model of the functional interrelationships of hierarchical levels.

We have assumed that the organization of cathetic energies is a hierarchy in which the forces of the basic energy distribution are controlled by a superim posed one arising from it, which in turn gives rise to another set of forces which are then similarly controlled, and so on; we assume that thought organization also follows this hierarchic layering [p. 703].

I cite this to illustrate the exceedingly long shelf life of these nineteenth century concepts. I should add that Gedo does not appear to subscribe to this aspect of Jacksonian theory.

What then is still acceptable in this hierarchical concept that influenced Freud and to some extent shaped psychoanalytic theory? Do we still believe that the temporal sequence of development can be categorized hierarchically? I am troubled somewhat by the image of an orderly sequence of development in that
we know that in accordance with Freud's concept of
nachtraglichkeit experiences are normally recontextualized. In this sense
developmental sequences do
not have points of closure. Nevertheless there are levels of functioning that ex
tend from the primitive to the more advanced which we
describe as higher and
lower. But is it correct to characterize this developmental sequence as a move
from the simple to the complex? If one turns to recent research in the area of the
infant's cognitive and motor development, one discovers that the primitive learn
ing processes in the infant are enormously complex. For example, a book by the
developmentalists Thelen and Smith (1994) describes the enormously complex,
nonpredictable, and emergent aspects of infant development. These authors
employ complexity theory and systems theory, as well as neurobiology, to conl30 Are Mental Functions Hierarchical?
struct a paradigm that will begin to do justice to their observations. Psychoanalytic infant research also
emphasizes the complexity of the mother/infant dyad and the fact that we have underestimated the infant's capacity for symbolic representation (Gergely, 1992). From this it can be judged that the reflex arc model has little or no relevance to early infant development. There is, however, another aspect of J. Hughlings Jackson's hierarchical theory that seems to me to be still relevant. I believe that the developmental and phylogenetic succession of involuntary to voluntary mental processes can be thought of as hierarchical. But this is a very ancient observation known to Aristotle and later elaborated by St. Thomas Aquinas, who observed that volition was a peculiarly human trait (Aquinas, 1264). One can think of this hierarchy, perhaps more accurately, as a continuum of degrees of freedom from current inputs whether from within or
without. But I am still left with the uneasy feeling that from evolutionary perspective our brains do not reflect an orderly ladderlike hierarchy with more advanced structures superceding the more primitive. We must remind ourselves that the God of evolution was a tinkerer rather than an engineer. Affect communication in humans, as you know, may be voluntary or involuntary. We think of the mature individual as one who is able to delay, restrain, and voluntarily control affective communication. Yet we also know that when we are confronted with grave danger it may be impossible: not to scream. In chimpanzees, however, the communication of affects is always involuntary. When chimpanzees, our genetically closest neighbor, are emotionally aroused, they cannot suppress their vocal cries. Jane Goodall writes: Chimpanzee vocalizations are closely tied to emotion. The production of a sound in the absence of the appropriate emotional state seems to be an almost impossible task for a chimpanzee. Goodall goes on to describe that on one occasion when Figan [a chimpanzee at the Gombe Stream Reservation] was an adolescent, he waited in camp until the senior males had left and we were able to give him some bananas (he had none before). His excited food calls quickly brought the big males racing back and Figan lost his fruit. A few days later he waited behind again, and once more received his bananas. He made no loud sounds, but the calls could be heard deep in his throat almost causing him to gag [quoted by Lieberman, 1991, p. 52]. It can be said that Figan, although he remembered the past, was bound to the present. This observation accords well with Gerald Edelman's distinction between primary and higher order consciousness (Edelman, 1989). Primary consciousness is the remembered present; perceptual inputs evoke specific categorical memories; and primary consciousness can then be described as episodic scenes, strung together like beads in a necklace. Higher order consciousness is a manylayered consciousness which enables the individual to create a model of past, present, and future, thus freeing one from the tyranny of ongoing events. This

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schema or internal model of past, present, and future provides a sense of continuity and coherence which could be described as the biological self. The sense

of self as an organizing, coherent-making, and meaning-generating agency is
either absent in primates or present in only a very
rudimentary form. These ob

servations then support the idea of a functional hierarchy
where higher men
tal structures provide for a freedom from the tyranny of
immediate perceptual

inputs.

The linguist Derek Bickerton has proposed a similar idea.
He contrasts two
basic modes of thinking that he calls on-line thinking and
off-line thinking. On
line thinking focuses on the immediate environment. He
defines on-line think
ing as computations carried out only in terms of neural
responses elicited by the
presence of external objects, whereas off-line thinking
involves computations
carried out on more lasting internal representation of
those objects. Bickerton
(1995) also believes that some primates and dolphins have a
protolanguage, but
it is a language that lacks syntactic structures which does
not enable them to go
off-line. For Bickerton, the discontinuity between
ourselves and other species,
that which makes us uniquely human, is our generative
grammar that allows us
to go off-line.

My studies of metaphor have also led to a similar
conceptualization (Modell,
1997a, b). I have suggested that there are two broad
classes of metaphor-one
involuntary and the other voluntary—which, from a
hierarchical point of view,
makes the involuntary metaphor lower (more primitive)
compared with the vol-
untary metaphor that is higher (less primitive).

As some of you may realize, there has been a revolution in
our thinking about
metaphor initiated by the work of certain linguists and
philosophers of language.

(Johnson, 1987; Lakoff, 1987). Metaphor is now viewed not
as a figure of speech
but as a primary mode of thought. Levin (1991) considers a
metaphor as the
mind/brain’s means of integrating across varying times,
sensory modalities, and
developmental modes. Metaphor belongs fundamentally to the
category of mind.

It is by means of metaphor that we generate new perceptions
of the world, and it
is through metaphor that we organize and make sense out of
experience. I have
claimed that metaphor is the currency of mind (Modell,
1990).

At the heart of the definition of metaphor is the idea of a
transfer of meaning
between different conceptual or perceptual domains. As
psychoanalysts we are
concerned with the transfer of meaning from the present to
the past and from the
past to the present. Metaphor serves as a mediating link
between these two dif-
f erent realms. As I mentioned, I have described two broad
classes of metaphor:
involuntary and voluntary. I have called involuntary
metaphors frozen meta

phors. When experiences are affectively salient, the memory
of the experience

is reevoked as a gestalt when there is a metaphoric
correspondence between

current perceptual inputs and old affective memories.

Metonymic associations

serve as trigger points, a part substituting for the whole.

Hierarchical? is perhaps the most immediate example of
this. We are all familiar with the fact that a metonymic
association to a particular or singular aspect of the
analyst in the here and now will trigger a global belief
that the analyst is identical to the analysand’s archaic
object. This involuntary transfer of meaning from the past
to the present explains the sense of the irrationality of
transference affects. There is a transfer of meaning from
the domain of the past into the very different realm of
current time, resulting in the sense that something
irrational is taking place. You recall that the essence of
metaphor is the transfer of meaning between different
domains. When metaphors are frozen, the correspondence
between different domains is fixed and invariant, so that
meaning is also fixed and invariant, whereas in open
metaphors, the meaning is ambiguous. For example, the
metaphor sex is the poor man’s opera is open to individual
interpretation. In an open metaphor, there is a play of
similarity and difference that is absent in frozen
metaphors. In this sense open metaphors are not involuntary
in that our imagination enters into the metaphoric process.

The novelist Walker Percy (1975), in discussing metaphor,
observed that there is a space between the name and the
thing that allows the individual to make mistakes in
understanding. It is these mistakes or purely personal
apprehensions that introduce a measure of freedom and
create new forms of understanding. To state it another
way, metaphor opens the door of the imagination, and it
is imagination and not merely language that makes us
uniquely human. Returning to the example of the
transference, when transference is in the process of being
at least partially resolved, there is a sense of playing
with the similarity and difference between the perception
of the analyst in current time and the imagoes of the
past. We think of the move from transference repetition to
transference resolution as a move from lower to higher
mental functioning. Similarly the progression from frozen to open metaphor is seen as a move from a lower to a higher mental function. That frozen metaphors represent a lower mental function is supported by the observation that in severe illnesses such as schizophrenia, there is loss of what has been described as symbolic functions. It is more accurate, however, to speak of a retreat to frozen metaphor with meaning fixed in involuntary associations. This process can also be observed in cases of massive trauma. A well-known example from a schizophrenic patient was provided by Hanna Segal (1957) in her "Notes on Symbol Formation." She described a schizophrenic patient who stopped playing the violin. When his doctor inquired why he had done so, he replied: "Why? Do you expect me to masturbate in public?" But we should not conclude that so-called "higher" mental process are necessarily "good" or that "lower" mental processes necessarily "bad." In cases of trauma, it is of evident adaptive value to find an invariant metaphoric correspondence in current experience with the memory of the traumatic event. We may think of a developmental hierarchy, but the crucial issue is the context in which the particular function is used. I am reminded here of a comment of William James who also recognized that different forms of mental functioning emerged in different periods of development. These modes of mental functioning, he said, must be viewed as tools or instruments dealing with particular tasks and that one was not intrinsically better or worse than the other (cited by Wertsch, 1991).

William James's advice can be usefully applied to the concept of primary and secondary process thinking. From one perspective, Freud's distinction between these two modes of thinking is ordered developmentally. The mode of primary
process of thinking in dream formation Freud viewed as a regression to an earlier form of mental functioning, where hallucinations substitute for perception.

Secondary process thinking, which involved the function of delay and attention to the reality principle, could be seen as a higher, more mature mode of mental functioning. Freud conceived of the secondary process as developmentally more advanced ego function which bound the irrationality of the primary process.

Yet it is almost universally recognized that creative thought must utilize the primary process and not be under the control of the reality principle, so that we have come to think of the relation of the primary to the secondary process somewhat differently than Freud envisioned. It is not a matter of the control of a more primitive function by a more advanced function, as J. Hughlings Jackson proposed.

One thinks instead of Ernst Kris's valuable formulation-regression in the service of the ego. Kris described that in creative thought there are rapid shifts between different levels of psychic functioning (Kris, 1952). Kris's concept of regression in the service of the ego is not at all consistent with the Jacksonian hypothesis that higher centers of mental functioning inhibit the lower centers.
What Kris suggests is that creativity, our most advanced mental function, requires an open and synergistic relation between what I would think of as different levels of consciousness (as exemplified by the use of frozen and fluid metaphor.)

When applied to the brain, Jackson’s hierarchical functional theory appears today to be controversial. The eminent Russian neurologist Aleksander Luria affirms Jackson’s hypothesis that the more recently evolved structures of the brain, such as the prefrontal cortex, are indeed more complex and do serve an inhibitory function (Schore, 1994).

Neurophysiologist Paul MacLean (1990) wholeheartedly adopted Jackson’s theory in The Triune Brain in Evolution. MacLean described the brain’s organization as hierarchical structures representing three evolutionary levels described as the proto reptilian, the paleomammalian, and the neomammalian. The protoreptilian formation is represented by the midbrain and basal ganglia, to gather with a thin shell of cortex including the hippocampus. Surrounding this

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McDermott, Chicago: University of Chicago Press.


Wertsch, J. Y. (1991), Voices of the Mind. Cambridge:
The fact that experiences within the analytic relationship, in real time, can alter affective memories of the past should be a cause for wonder. This essay is an attempt to focus in greater detail on this still somewhat mysterious process. I do not present any new clinical observations, but rather discuss familiar aspects of the psychoanalytic process from a somewhat different perspective, a perspective that has been influenced by Gerald Edelman’s (1987, 1989, 1992) contribution. Psychoanalysis has long been viewed as a method through which an individual could be relieved of the burdens of the past. We know that the compulsion to re-create, painful past experiences in current time is a major source of neurotic suffering. Of course, nothing can change what objectively happened in the past; what can be changed is the affective component that the patient carries within as living history (Loewald, 1980). Such transformations are the antithesis of an involuntary repetition of the past. The intersection between the present and the past in psychoanalysis is mediated through the transference, which selectively activates specific aspects of old relationships so that the past is experi
enced in the present. We know that these memories of the past may be admixed with fantasy. But inasmuch as I intend to explore the interface between psychoanalysis and neurobiology, I focus on memory and assume a traumatic model of psychopathology—that past experiences are actual. For the purposes of this presentation, I bracket the important subject of fantasy, for an exploration of fantasy will take us too far afield. Frank Bidart, the poet, has spoken of the tragedy of untransformed givens, and we all know what beginning psychoanalysts soon recognize—that there are limits to what can be transformed by means of psychoanalytic treatment. In 1896 when Freud was still viewing neuroses as traumatic in origin, he observed that psychopathology represents, at bottom, a failure of the retranscription of memory.

What we ultimately suffer from, Freud believed, is not the events themselves but our inability to transform the memory of those events. I have suggested that metaphor is an essential element in the transformation of traumatic memories and, further, that the metaphoric process provides the necessary bridge between the past and the present: memory. By means of this process, metaphor and affects are synergistically linked (Modell 1997 a, b; see also Levin, 1991). When there is a compulsion to repeat the past, as in traumatic memories and in transference repetition, the space between the present and the past is narrowed—past and present become undifferentiated. There are times when aspects of the affective bond between the self and other in the present are experienced as a total re-creation of a scene with actors from the past. When this occurs, the individual may feel as if they have fallen into a time warp: they
experience a kind of circumscribed craziness in that the present is experienced as identical to the past. We believe that the correspondence between present and past has been fixed by means of frozen metaphors. From this point of view, one aim of psychoanalytic treatment is to convert these frozen metaphors into fluid, generative metaphors. A deeper understanding of the relation between memory and metaphor was made possible by recent contributions of researchers outside of psychoanalysis. A short list of those who have revolutionized our thinking about metaphor and memory would include the linguist George Lakoff (1987), the philosopher of language Mark Johnson (1987), and the neurobiologist Gerald Edelman (1987, 1989, 1992). For centuries metaphor has been thought to be a figure of speech, merely a trope, that adorned and enriched language. It was a subject that could be classified under the heading of rhetoric. Metaphor was then a specialized subject, a topic of investigation for linguists, literary scholars, and philosophers of language who were concerned with the problem of nonliteral meaning. Until recently, most of these scholars accepted Aristotle's definition of metaphor, equating metaphor with analogy. Aristotle viewed metaphor as an adornment of speech conferring a certain elegance and beauty of style. If metaphor had continued to be understood only as a trope, the subject would have little interest to those of us who are students of the mind. Recently, however, there has been a revolution in our understanding of metaphor. In retrospect it appears that scholars have been guilty of what philosophers call a category mistake, for metaphor belongs primarily to the category of the mind/brain and only secondarily to the category of language. Metaphor is a basic and primary element of thought; it is the currency of mind, the process through which meaning can be transferred between different domains and thus transformed. Therefore, metaphor should be viewed as central to the concerns of neurobiology, cognitive science, and psychoanalysis. Aristotle was not entirely wrong in describing metaphor as an analogy, but an analogical correspondence is only the first step in the metaphorical process; the essential second step is the transfer of meaning from one domain to a dissimilar

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domain. In the broadest sense, metaphor is a template by which we parse com

plex, unfamiliar experiences onto the familiar (Holland, 1995). This is one of
the fundamental tasks of our brain and mind. I have proposed that there are two

broad classes of metaphor: metaphors that can be described as frozen, foreclosed,

or fixed and metaphors that can be described as open, fluid, and generative. The

former are phylogenetically and developmentally more primitive. When meta

phor is frozen, the metaphoric process is involuntary and automatic. Meaning is

transferred between different domains, but the metaphor itself is unambiguous

whereas fluid metaphors are ambiguous so that the attribution of meaning is not

involuntary but a function of the self (Modell, 1997b). The process is no longer

involuntary in that the self enters into what is perceived. Meaning not only is

transferred to a dissimilar domain, but it is also transformed by the imagination.

The metaphoric process, in this latter case, is the means through which new

apprehensions of the world become possible; it is the business of metaphor to

break open and extend the categories of our thought (Turner, 1988). The perva

siveness of metaphor in language reflects this fact that metaphor is fundamental

to the way we experience the world. I plan to show that memories of intense emotional experiences are templates

that are coded in current time by means of frozen metaphors. Such memories do

not stand alone but are members within a category of
experience, a constituency

gathered by means of metaphor. Experiential memories can be thought of as

private metaphors in that they are not part of a shared public language. I have

described this process as the formation of affect categories (Modell, 1990). Af
nect categories function as unconscious potentials for action that are created or
reevoked when there is a metaphoric correspondence between current perception and categorical memories of the past. A familiar example is transference repetition, where meaning is mapped between the dissimilar domains of the past and present time. Transference metaphors are frozen in that the transfer of meaning between the times past and the present is unconscious and involuntary. The transformation of frozen metaphor into fluid or generative metaphor requires a complex state of consciousness which I shortly describe as the metaphoric mind. The concept of an affect category derives in part from Gerald Edelman's theory of memory, which I now attempt to summarize. Edelman's (1989) theory of memory is revolutionary in that he proposes that memory is both categorical and retranscriptive. He said, 'Until a particular individual in a particular species categorizes it in an adaptive fashion, the world is an unlabeled place in which novelty is frequently encountered . . . . Therefore the primordial task faced by the brain is that of labeling an
unlabeled world" (p. 4). This is accomplished by means of perceptual and conceptual categories. It is evident that category formation is dependent on memory. For Edelman (1987) memory and category formation are nearly identical processes. He says, "A memory is the enhanced ability to categorize associatively, not the storage or isomorphic features of attributes as lists" (p. 241). Edelman suggests that memory and categorization rely on similar neuronal processes. Memory is not a store of fixed or coded attributes. Instead, memory consists of a process of continual recategorization, which must involve continued motor activity and repeated rehearsal (Edelman, 1989, p. 56). Perceptual categorization and the recategorization of memory depend critically on reentry. Reentry is defined as a process of temporarily ongoing parallel signaling between separate neuronal maps (Edelman, 1989, p. 56). These global mappings constitute a necessary substrate for relating categorization to memory. Reentrant processing of separate neuronal maps can be analogized to the communication that exists between members of a leaderless string quartet. Edelman's theory represents a sharp break with the traditional idea of memory as a storage system from which items are retrieved. Memory is not a process of retrieval from some static memory bank because the brain's memory is not like that of a computer with its permanent memory into which items are entered and withdrawn. What the brain stores is not simply isomorphic with perception; experiential memory is actively selective in accordance with past memorial categories. Experiential memory exists as a latent potential that can be revived as an actual memory if current inputs, specifically metonymic associations, reevvoke the original experience. One cannot claim that all memory is categorical, for memory may also be domain specific, for example, our memory of faces is not categorical. There is a distinction between experiential memory and what has been called semantic memory, the memory of acquired impersonal knowledge. These two forms of memory activate different neural circuits (Vargha-Khadem et al., 1997). As psychoanalysts we are not privileged observers of semantic memory in that we primarily observe autobiographical, experiential memory which, I am virtually certain, is categorical. The idea that memory
is retranscriptive is not entirely new as this observation
was intuited by Freud (1896) as shown in his concept of
Nachtriiglichkeit. That memory is retranscriptive was
also noted by Sir Frederick Bartlett in 1932 when he said
"Remembering is not the re-excitation of innumerable fixed,
lifeless and fragmentary traces. It is an imaginative
reconstruction" (p. 213). Neither Freud nor Bartlett
understood memory, as did Edelman, to be both
retranscriptive and categorical. Edelman's theory of
memory must be viewed in the larger context of his theory
of neuronal group selection. For several years I have tried
to demonstrate the importance of Edelman's ideas for
psychoanalysis. What is especially important for
psychoanalysis is his fundamental assumption that the brain
is formed through its interaction with the environment. For
the developing infant, this not only means interaction with
the Piagetian inanimate environment of stationary and
moving objects, but also the human environment which is the
infant's mother and other caretakers. Edelman's theory is
congruent with a recent hypothesis that the infant and the
mother form a self-organizing system that

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expands the infant's state of consciousness (Tronick,
1998). It appears likely

that the infant's brain is sculpted through the infant's
interaction with their mother

(Schore, 1994.) I cannot improve on Oliver Sacks's (1990)
comment on Edelman's

theory of neural Darwinism "that the brain reflects the
life experience of each

individual human being. So that will , sensibility, moral
sense and all that one

would call personality and soul becomes engraved in the
nervous system"

(pp. 44-50). I now provide some clinical examples of
affect categories. Affect categories

are ubiquitous so that any analyst can provide similar
illustrations. The follow

ing affect category was the consequence of a single
traumatic episode. A patient
reported that when he was about two or three years old his mother had a spontaneous miscarriage. He was able to reconstruct that in all probability his mother became "hysterical" and was emotionally distraught for an undetermined period of time. As a witness to these events, he felt as if his mother had gone crazy. As an adult he was very tolerant of craziness in women if he was not attached to them, but any sign of irrational thinking on the part of a woman to whom he was dependent, such as his wife, made him extremely anxious. This unconscious affect category was that of woman's irrationality limited to women on whom he was dependent. This past affective experience is activated and re-created in real time by means of a metonymic association. At the moment when he was responding to his wife's "irrational" behavior, the distinction between past and present was obliterated. The following illustration is that of chronic and cumulative trauma that resulted from a father's devastating illness. A female patient’s loving relationship with her father was irrevocably lost, when, in her early childhood, her father developed a brain tumor which led to the gradual deterioration of his personality and his eventual death. The affect category that was evoked could be described as the terror that ensued when she sought care and
protection from someone who

was incompetent. Forty-five years later, a metonymic
association revived all the

affects associated with her earlier relation with her
father. The metonymic trig

erg, which substituted the part for the whole, was her
observation that her male

companion was driving slowly, overly cautiously, and, in
her judgment, incom

petently. She wondered whether he was developing brain
damage and becoming

precociously senile. She became enraged at him and then
became guilty because

of the irrationality of her reaction. The metonymic
association, her friend's overly

cautious driving, evoked the entire scene from childhood
with all its accompa

nying affects. The metaphoric correspondence between past
and present is then

experienced as an exact fit; there is only a sense of
similarity and not of differ

ence. To experience such an ensemble of feelings from the
past in current time is

a bit crazy making, as if one has momentarily fallen into a
time warp. I now turn to the subject of transference
repetition. I recognize that the phe

nomenology of the transference is enormously complex and
what I present is 142 The Transformation of Past
Experiences simplified and overly schematic. My patient is
imaginary because what I describe represents a composite
of several patients. Trying to isolate single elements in a
highly overdetermined process is analogous to a thought
experiment, but unlike the philosopher's thought
experiments, it is one derived from the experience of
psychoanalysis. Let us then imagine, in schematic form, an
interaction between analyst and patient that can be taken
as emblematic. Let us consider a female patient whose
mother was depressed and emotionally absent for the first three years of her life. Let us further imagine that I, during a given hour, was momentarily withdrawn and inattentive. This action on my part served as a metonymic association, where a part substituted for the whole. This metonymic association served as a trigger which evoked a global response in the patient. It can be said that metonymy reconstructed a categorical memory. She then perceived me as identical to her mother in every possible way. My patient complained not only that was I withdrawn and inattentive as was her mother, but also as her mother, I had no insight or empathy and did not understand who she was, or anything about her, despite the fact that we had been working together for many years. I initially responded as I would to someone in everyday life who was angry and accusatory and in addition caused me to view myself as somebody I did not wish to be. Of course I privately rejected the observation that I was totally without empathy and did not know who she was. I did not say any of this, but did admit that I was in fact inattentive in that particular hour. However, in her reaction to my inattention, she experienced only the similarities to her mother and not the differences: she perceived me as identical to her mother in every detail. This intervention could be described as a transference interpretation at the height of affective urgency, saying in effect, "I am not your mother." You will recall that Strachey, many years ago, noted the transmuting effect of such transference interpretations. He believed that such interpretations given at the height of affective urgency established the difference between the immediate object of the analyst and archaic object. The very act of making an interpretation, apart from its content, differentiated me from her mother. I intend this clinical fragment to illustrate that transference repetition can be understood as a frozen metaphor which is evoked by a metonymic association to some aspect of the analyst in current time. Further, and this is the point I wish to emphasize, the focal point, or leading edge, of the process we describe as the resolution of the transference is a complex state of consciousness that accepts the simultaneity of sameness and difference. It is this oscillation of sameness and difference that characterizes the fluid in contrast to the frozen metaphor. As we know, by simply doing their job analysts demonstrate that they are different from the patient’s archaic imagos. Innumerable repeated small steps accomplish this over time. During this process of "resolving" the transference, both analyst and patient share in a complex state of consciousness which recognizes the simultaneity of
sameness and difference.

ARNOLD H. MODELL 143 We must then examine further the origins and components of this multi
layered consciousness which allows one to accept the apparent paradox of the
simultaneity of sameness and difference. I call this the metaphoric mind. For
those patients who cannot accept this paradox, who cannot utilize their meta
phoric mind, the experience of the past remains unchanged, and their view of
the analyst remains fixed. The analyst’s presence evokes an involuntary affect
category in which only the similarity between the past and the present is per
ceived. The analyst’s attempts at interpretation or their demonstration through
their actions of the difference between the past and present is totally ineffectual.

To return to our imaginary patient, let us assume that, unlike her mother, I showed
by my actions and by my tone of voice that I was emotionally responsive to her,
yet the patient retorted: “I really know intellectually that you are not my mother,
but you feel like my mother.” The patient’s state of consciousness lacks the com
plexity of the metaphorical mind and remains one dimensional, perceiving sameness
but not difference. The differentiation between fixed associations and a freely expanding imagi
nation is not a new idea as something analogous was observed in the first quarter
of the nineteenth century by the poet and critic Samuel Taylor Coleridge

(Richards, 1969). Coleridge contrasted two states of consciousness: one he called fancy and the other imagination. In the state of consciousness described as imagination, the mind is growing, whereas in fancy it is merely reassembling products of its past creation, ready made from the law of association. Imagination consists of the coalescence of subject and object. "Into the simplest seeming datum a constructing, forming activity from the mind has entered. The self has gone into what it perceives, and what it perceives is, in this sense, itself. So the object becomes the subject and the subject the object" (p. 57).

In summary, Coleridge described the oscillatory state of consciousness, the simultaneity of sameness and difference, that is an attribute of the metaphoric mind. I have suggested that the transformation of past experiences require the complex, multi leveled consciousness characteristic of the metaphoric mind. I hypothesize further that this complex state of consciousness comes into play when the environment is relatively safe. When the environment is perceived as unsafe, when there is a threat to the cohesion or continuity of the self, consciousness becomes one dimensional. The conditions of safety, essential to the metaphoric mind, need to be understood both from a developmental and
evolutionary perspective. As a developmental hypothesis, I propose that the origin of the metaphoric mind can be traced to the safety of the mother-infant dyad, what Winnicott metaphorically described as the holding environment. The holding environment is essentially a caretaking environment, which, if functioning adequately, creates a sense of safety in the world. Although the infant responds to the inanimate environment, to light and darkness, to sounds, to moving objects, I agree with Marion 144 The Transformation of Past Experiences Milner (1957) who observed that "in the beginning one's mother is literally the whole world" (p. 116). As noted earlier, these environmental inputs shape the architecture of the developing infant's brain. As I later describe in greater detail, within the safety of the holding environment, during the first year of life, the infant begins to experience the paradox of the coexistence of similarity with and difference from their caretakers. Or to put it differently-the paradox of the coexistence of oneness and two-ness. These are, I believe, the preconditions for the later development of the metaphoric mind. In describing the contribution of the holding environment to the infant's developing mind/brain, I am making certain assumptions regarding the brain's plasticity. This subject is, as you know, quite controversial. For there is considerable debate regarding the relative significance of environmental inputs for the developing brain. My own position, and I suspect that of most psychoanalysts, is that environmental inputs shape the architecture of the developing infant's brain. Those who attribute an inordinate influence to the fixed instructions of the DNA oppose this belief. This question of the brain's plasticity has divided neuroscientists and cognitive psychologists into opposing camps. The controversy is essentially one concerning the extent to which the brain is thought to be genetically hard wired. There are those who give credence to an overriding genetic determinism and consequently minimize the role of the internal and external environment in the development of the mind/brain (Lewontin, 1991). At present there is a resurgence of a reductionistic movement that attributes
complex behaviors to the influence of genes. When combined with hard artificial intelligence, this belief can lead to a psychological naivete reminiscent of behaviorism. For example, in a recent popular book titled How the Mind Works (Pinker, 1997), psychology is defined as the "analysis of mental software." According to this view, thought is nothing but an algorithmic computation. We have those who believe that the fundamental processes of the mind works as algorithmic computations, and on the other hand, there are those of us who believe that the metaphoric process is fundamental, a process that is not limited to verbal elements but includes images and sensations as well. The position of psychoanalysts in this debate should be fairly clear. The infant's inanimate environment is one of light and darkness, sounds, and fixed and moving objects, but within this inanimate environment, there is another more compelling human environment. The infant is held and feels contact with the mother's skin, feels her warmth and through proprioception continues to feel the rhythm of her heartbeat that was earlier sensed in the uterus. Her voice is also the familiar voice heard in the uterus. Central to the infant's postnatal experience is the mother's gaze; it is the mother's face that the infant watches while nursing. If all goes well, the infant experiences a sense of safety. From numerous observational studies of infants and their mothers, it can be inferred that within this holding environment, at some point during the first year of life, the infant is conscious of simultaneously feeling similar to and different from his or her mother; the infant is conscious of union and separateness. Such infant researchers as Daniel Stern and Colwyn Trevarthen (Stern, 1985) observe that the infant can differentiate self from nonself almost immediately after birth. Trevarthen noted that the infant is actively curious in exploring its environment within minutes after birth. Stern reports his observation of Siamese twins who sucked each other's fingers yet were able to differentiate their own hands from
those of the other. These researchers believe that the infant is aware that it is the agent of its own actions. All these observations allow us to infer that the infant is aware of its separateness from the mother, yet there is another set of observations that point in a different direction. These observations suggest the inference that the infant may also experience a sense of coalescence or merging with the mother, an experience of sameness. This can be inferred from the process of affect attunement. Inasmuch as the mother attunes her affects to that of the infant and the infant attunes his or her affects to that of the mother, it is reasonable to suppose that at times the infant cannot differentiate what feelings belong to the self and what feelings belong to the mother. The contiguousness or contiguity of affects that characterizes the mother-infant dyad is biologic given. It is something that we never outgrow, for at times as adults we also have the experience of not knowing whether feelings were placed in us by the other or whether they arise from within ourselves.

Edward Tronick (1998) and Colwyn Trevarthen (1989) have independently proposed not only that the infant's and mother's affects joined together but also that the infant's and mother's consciousness is conjoined. Tronick reports that
there is evidence that the mother is part of the infant's somatic regulatory system, for example, that contact with the caretaker's body regulates the infant's temperature. By analogy, he proposed that it is also true that contact with the mother's mind, the mother's state of consciousness, regulates the infant's state of consciousness. The mother's more advanced and more complex state of consciousness includes her awareness of her union with and separateness from her infant. This awareness reinforces a corresponding state of consciousness within the infant. This complex consciousness in the developing infant was also noted by Levin and Trevarthen (this volume). If affects and states of consciousness are shared and similar, yet at the same time the infant is cognitively aware that they are enclosed within the separate envelope of their own body, a complex consciousness of sameness and difference ensues. Again, I suggest that a necessary precondition for this complex state of consciousness is the safety of the holding environment.

This speculation that infants develop a complex, multileveled consciousness is supported not only by psychoanalytic observers but also by cognitive scientists, who report that the infant's capacity for imaginary play appears between
the ages of 18 and 24 months (Karmiloff-Smith, 1992). At this age the infant is able to differentiate objects as they are "in reality" from the same object 146 The Transformation of Past Experiences transformed by the child's imagination—a block of wood can become a truck. Therefore the real and the imaginary must be simultaneously held in consciousness. Further, the infant or young child is aware of a metaphoric correspondence between the imaginary and the actual object. If the metaphoric mind is an aspect of normal development, we would predict that a prolonged continuous disruption of the safety of the holding environment in the first and second year of life would impair the developing capacity for metaphoric thought. It is been noted (Schore, 1994) that prolonged stress produces elevated levels of corticosteroids which have an adverse effect on developing neural structures. Specifically, there are recent reports that the hippocampus shrinks under stress and that monkeys exposed to short periods of stress do not grow new hippocampal cells (Gould and McEwen, 1998). Therefore, it is not unreasonable to suggest that the stress of a prolonged disruption of the infant's holding environment will interfere with the formation of those neural circuits that support a complex state of consciousness. This may result in an irreversible impairment of the metaphoric mind. Such impairment may help to explain why some patients suffering from severe early deprivation may prove to be unanalyzable. To be sure, this is only a hypothesis, but one that can be confirmed or disconfirmed. We know that the capacity to make use of psychoanalytic treatment is multidetermined, but among the myriad reasons why someone cannot make use of the analytic method, some patients cannot make use of psychoanalysis because of their incapacity to use metaphor. Inasmuch as there is a synergy between affects, memory, and metaphor, these patients also suffer from an inability to use emotions as signals to themselves (McDougall, 1980; Modell, 1985). Joyce McDougall described a category of psychoanalytic patients as "antianalysands." These are patients who at first appear to be suitable candidates for psychoanalysis, but as the work proceeds, one learns they are unable to make use of the analytic method because they lack a capacity for metaphoric thought. A common denominator in these cases may be severe impairment of the caretaking environment in the first or second years of life. There is also evidence that when individuals are exposed to a massively unsafe environment after the formative years of childhood, they may also
suffer a loss of the metaphoric capacity. For example, those who survived the Holocaust have reported that they have lived in a world that is beyond metaphor (Bergmann and Jucovy, 1982; Grubrich-Simitis, 1984). This loss of the metaphoric capacity may extend to children of survivors through a form of cultural transmission. This loss of the sense of safety appears to have been communicated from the inner world of the parent to the inner world of the child. How this process occurs is not clear. What characteristically develops can be described as a primary identification with the parents as victims. The parents’ memories and survivor guilt become as their own. In Other Times, Other Realities (1990), I reported such cases and Bergmann and Jucovy also report numerous examples in which the children of survivors also suffer from a loss in their capacity to experience metaphor. There is an apparent loss in the capacity to experience the play of sameness and difference, especially regarding identification with the parents. Instead of

the play of sameness and difference which normally occurs in the process of

identification, the children experience total identification. For example, the child of a survivor, a college student, withdrew from all social contacts. Her father had escaped being murdered by the Nazis by going into hiding. This young woman was not simply behaving like her father when she withdrew from social contacts—she was her father in hiding. Bergmann and Jucovy also describe how

this loss of metaphoric capacity can be reversed through psychotherapy.

In this essay I have focused on a familiar problem: how
experiences within

the analytic relationship can alter the affective memories of past. A traditional

formulation of the therapeutic action of psychoanalysis, which most of us rec

ognized as too pat to be to be adequate, is that affective experiences of the past

are activated through the transference, which is then resolved by means of inter

pretation. The recent advances in linguistics and neurobiology have provided us

with the tools for a more fine-grained microanalysis of this familiar process.

Lakoff's (1987) and Johnson's (1987) work on metaphor, combined with

Edelman's theory of memory, provides us with a powerful conceptual instru

ment with which to understand transference phenomena. Transference repeti

tion can be understood as a focal freezing of metaphor, so that metonymic asso

ciation to any aspect of the analyst in current time will evoke an automatic and

involuntary response.

Patients who have suffered from extensive trauma have taught us that the

freezing of metaphor can become a global rather than a focal response. As in the

focal disturbances of a transference repetition, this is also accompanied by an

altered one-dimensional state of consciousness—a state of consciousness is one

in which there is difficulty in accepting the paradox of
the simultaneity of simi
larity and difference. This absence of what we have called the metaphoric mind
can be understood as an emergency measure in which ambiguity is a luxury that
cannot be afforded in a dangerous world. The loss of ambiguity prepares one to
meet present dangers, but there is price to be paid which is an inability to trans
form past experiences.

From an evolutionary perspective, responses that are fixed, automatic, and
invariant can be thought of as more primitive. When we categorize the world in
accordance with frozen metaphors and respond automatically, the agency of the
self is relatively silent and inactive. This invariant and involuntary emotional
response is something that we share with other species yet transcend at the same
time. We are the only species with the capacity for metaphor. This capacity is
part of what Edelman calls higher order consciousness. It is this higher order

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In 1986, Nobel laureate biologist Walter Gilbert referred to the Human Genome Project as "the grail of human genetics ... the collective answer to the command 'know thyself'" (see Shattuck, 1996, p. 173). Gilbert's exuberant statement reflects the level of assertiveness and pride generated among the research community in human genetics and biology as a result of their impressive discoveries. Psychoanalysis as a profession has, by and large, been very slow in responding and investigating such claims. Many psychoanalysts have viewed biological research as irrelevant to psychoanalysis. Some others, in private exchanges, have characterized it as a cultural defense against introspection and the awareness of the unconscious process; they have prepared themselves for another long siege such as the one Freud encountered at the turn of the century. John Gedo is one of the few who have diligently worked to integrate biological research into psychoanalytic theory and practice. As far as I know, he is the only one who anticipated these developments long before they occurred. In this essay, I address the difficulties that lie in the path of psychoanalysts who strive to incorporate into their clinical work and theoretical orientation an
interdisciplinary perspective that takes seriously into account the knowledge generated by recent neurobiological research, cognitive science, and develop mental studies. My essay is somewhat autobiographical, given the fact that I am still engaged in this struggle and have not as yet achieved the level of integration I have wished for. As a medical student, I had approached my studies in biology as the dues I had to pay to become a psychoanalyst, and I was delighted when I reached the point at which I could devote all my time to the understanding of the human mind, more or less to the exclusion of the understanding of the body. I have, of course, always assumed that my interest and activities as a psychoanalyst are, for the most part, scientific. Like most of my colleagues, I have taken for granted the dual roots of psychoanalysis, namely, science and humanism. Knowledge and Ignorance in Psychoanalysis but, until recently, I have not tried to define how well fused these two elements are. During the last 25 years, Freudian metapsychology and its links with biology and the nineteenth-century scientific world have, for the most part, been discredited, and elaborate debates have taken place between those who dispute the scientific basis of psychoanalysis and those who defend Freud's claims for a place in the Weltanschauung of science. I have followed some of these debates, up to the point at which they become esoteric and obsessional in nature and removed from the activities of most psychoanalytic professionals. Perhaps this reflects more my personal limitations rather than the limitations of the issues involved, but I know I am not alone in feeling this way. The introduction of neurobiological research into the field of psychoanalysis has provided a new pragmatic opportunity for psychoanalysis
to reclaim its scientific status. How much of an opportunity remains to be seen. A good deal depends on the willingness of psychoanalysts to study the new discoveries in depth and to educate themselves in a technical field very different from the one with which they are familiar. Furthermore, psychoanalysts must entice neurobiologists to take a serious interest in psychoanalytic data and thus set in motion a process that can cross-fertilize both fields. The intellectual arguments for and against the need for such an interdisciplinary exchange largely pertain to different definitions of what psychoanalysis is and what it is not. However, this is not the issue that I address in this presentation. Instead, I try to identify certain prevailing common denominators in the cherished values, identifications, and commitments of psychoanalytic professionals which have shaped their sense of self and their perceptual instruments as clinicians and thinkers. These common denominators will largely determine the readiness of psychoanalysis as a profession to enter into a meaningful and productive dialogue with the professionals from the neurosciences. Obviously there are important differences between one individual and another, but all members of the psychoanalytic profession have been deeply affected by the educational process they undergo, which is highly personal in nature and designed to instill in the student’s mind certain group values and priorities. Furthermore those values and priorities are being constantly reinforced—long after the candidate’s graduation—through a system of rewards and punishments. Given these circumstances it is inevitable that a good deal of this input becomes internalized, as a result of which the members of the psychoanalytic profession acquire certain common characteristics in their value system and temperament. Many of them selected the profession of psychoanalysis because of their affinity with its values and temperament. For them the external input only reinforced what was already there. It is important, however, not to underestimate the influence of the culture within which psychoanalysts develop their ideas, convictions, and attitudes.

GEORGE MORAITIS 153 Psychoanalysts are the products of a carefully cultivated culture within the bounds of “free-standing” psychoanalytic institutes, as designed by Freud. These institutes not only aim to provide for their students maximal exposure to psycho
analytic knowledge, but they also shield the students from the forbidden
knowledge that is deemed irrelevant or dangerous to psychoanalysis. Upon gradu-
ation, these same institutes become the professional home for the mature ana-
lyst, who strives to acquire recognition and a broader intellectual and scientific

perspective. Despite the obstacles, some achieve their goals; however, when they
attempt to import their new perspectives within the confines of these free-stand
ing organizations, they usually encounter great opposition, which generally takes
two forms. The new perspective is either rejected as irrelevant to psychoanalysis, or ac-
cepted, but as simply another version of what is already known. In psychoanalysis
all claims to novelty and discovery are viewed with great suspicion, and must be
approached as rediscovery in order to receive a fair hearing. For example, the
renewed interest in Freud's "Project," in response to the explosive progress in
neurobiological research, may well constitute an effort to present the new infor-
mation as psychoanalytic rediscoveries to make them more acceptable to psycho-
analytic readers. The extreme conservatism that characterizes psychoanalytic education, and
the psychoanalytic profession in general, is particularly evident in the applica-
tion of the psychoanalytic method. The "tool and method
pride" (Kohut, 1975)
which dominates the field of psychoanalysis is equally strong in all schools of psychoanalytic thought, and constitutes the single most prominent common denominator of most psychoanalysts' sense of professional self. There are very good reasons for psychoanalysts to be proud of this method. It is the instrument through which scientific data are collected, and its therapeutic effectiveness has been demonstrated repeatedly. In a scientific enterprise, however, the method should not be confused with the procedure. All sciences rely on the scientific method for the data they collect but utilize a variety of procedures in collecting such data. In psychoanalysis, only one procedure is considered legitimate, as a result of which little experimentation is possible, and valuable data are dismissed as irrelevant. A few years ago, I edited a volume of Psychoanalytic Inquiry (Moraitis, 1995) titled The Relevance of the Couch in Contemporary Psychoanalysis. It seemed to me rather paradoxical that, given all the changes introduced in psychoanalytic clinical theory during the last 30 years, no new rationale has been developed and no questions have been raised about the relevance of Freud's original recommendation about the clinical setting in general and the use of the couch in particular. The eleven contributors to the volume
represented a wide spectrum of theoretical orientations. None of the contributors claimed empirical clinical knowledge in conducting an analysis without the use of the couch for experimental purposes, although at least three of them expressed the conviction that the traditional analytic setting may not be the optimal one when dealing with archaic experiences encoded in preverbal signs. It would be extremely risky for a psychoanalyst to carry out experimentations outside the traditional analytic setting. Data generated by such experiments would not be admissible as psychoanalytic and would be treated with not-so-benign neglect. To enter the data base of psychoanalytic knowledge, the application of the traditional psychoanalytic method is essential. The traditional analytic setting not only is the "proving ground" of all theoretical propositions, it also defines the boundaries of what constitutes psychoanalytic knowledge, which is based on personal experiences derived from the analysts' own analyses and from analyzing others, conducted within the bounds of the one and only legitimate procedure. Given the narrowly defined boundaries of the psychoanalytic data base, it is extremely hard for the scholars and researchers of related fields to be recognized as contributors to psychoanalytic knowledge. Presumably this will prevent the "gold" of psychoanalysis from being contaminated with other metals. More likely it prevents psychoanalysts from coming under the influence of forbidden knowledge. This "us versus them" attitude undermines all aspects of interdisciplinary research. I had a personal experience in this regard (Moraitis, 1979). For many years, I have experimented with a modified version of the psychoanalytic method that I applied in my collaborations with biographers. The aim of this project has been to study the psychological forces that enter into the writing of a biography and assist the biographer in bringing his work to a successful conclusion. Every time I have presented my work to a psychoanalytic audience I have received praise, but my work is referred to as "psychotherapy." This implies that my data are not admissible to psychoanalysis. Only John Gedo, who was my consultant on the first such project I undertook, and a few other analysts, have been willing to credit my work as psychoanalytic. What constitutes the gold of psychoanalysis, and what are the other metals that constitute the forbidden knowledge? I think the prevailing sense of what is fundamental in psychoanalysis has
undergone significant changes during the last 25 years. The original definition pertains to Freud’s “fundamental hypothesis” about the unconscious and the concept of psychic determinism. Accordingly, the gold of psychoanalysis pertains to the data generated by the uncovering of the unconscious process, which involves systematic introspection facilitated by the application of the psychoanalytic method. In contrast the “forbidden knowledge” pertains to the data of consciousness collected by those who are uninformed about the existence of the unconscious and attempt to explain what is psychical by observation from without rather than from within. Freud devised the psychoanalytic method in an effort to facilitate introspection and open a window through which certain elements of the unconscious could reach consciousness. Those elements pertain to what was repressed in the dynamic unconscious. According to Freud, only the repressed ideas in the dynamic unconscious are potentially knowable by the use of the psychoanalytic method.

The rest of the large domain of the system unconscious remains unknowable. In his 1923 paper, he writes: We recognize that the uses does not coincide with the repressed. It is still true that all that is repressed is unconscious, but not all that is unconscious is repressed . . . . When we find ourselves thus confronted by the necessity of postulating an unconscious that is not repressed we must admit that the characteristics of being unconscious begin to lose significance for us. It becomes a quality which can have many meanings, a quality which we are unable to make, as we would have hoped to do, the basis of far reaching and inevitable conclusions [p. 18]. The unconscious as a psychic "system," largely unknown, and the unconscious as a domain, presumably knowable, are two very different concepts that have widely different theoretical and clinical implications. Despite the original resistance Freud’s ideas created, the concept of the
unconscious as a psychic

system, largely unknown, has captured the imagination of our culture and has

been embraced by many creative thinkers in the humanities. In contrast, Freud’s proposition about the dynamic unconscious has become

primarily the indispensable part of psychoanalytic clinical theory, because it

provides the clinician with certain configurations by which clinical data are or

ganized. By and large all psychoanalysts proceed with the notion that they have

privileged information about the existence and contents of the unconscious which

they have collected by the application of the psychoanalytic method. For the

psychoanalyst, the unconscious represents the repository of all knowledge about

human nature, and the psychoanalytic method the only means by which we can

acquire scant knowledge about it. Such notions parallel Plato’s story of the cave

men in The Republic (n.d.), according to which human beings, like prisoners,

are chained to the wall of a dark cave where they cannot tum around to see the

light, and mistake the shadows of objects as real. The task of the philosopher is

to emerge from the cave and glimpse into the true source of being. When the

philosopher, who has seen the light, returns to the cave to inform the prisoners

of their misperceptions, he only succeeds in provoking their ridicule. Before
they can be persuaded, they must experience the light themselves, a process that constitutes a formidable task. The experience of the psychoanalyst can be compared with that of the philosopher as Plato described it. Psychoanalysts claim that they have seen glimpses of the light, but when they tell this to the cavemen they are ridiculed. Only by persuading them to follow their path, they can show the cavemen the light. Within the bounds of this metaphor, the light is the unconscious, and the shadows the data of consciousness. This deeply instilled belief and sentiment in the field of psychoanalysis makes all interdisciplinary studies problematic, because it places psychoanalysis under the cast of a belief or faith system, rather than that of a scientific enterprise. In the quest for understanding human nature and mastering the complexities of mental illness, psychoanalysis cannot justifiably make claims to a monopoly. Psychoanalytic nosology and treatment must take into consideration the knowledge gained from other related fields. The psychoanalyst’s sense of identification with the world of science that dominated the field of psychoanalysis up to the late sixties and early seventies was built on a very narrow basis. It is for this reason that, during that time, no meaningful bridges were built with other disciplines, despite the medicalization of psychoanalysis in the United States. Systematically, psychoanalysts placed themselves in opposition to biological research and to cognitive sciences, as a result of which they found themselves increasingly isolated as a profession. This was not, of course, true across the board, and it was through the work of the few well-informed thinkers that psychoanalysis shed the pseudoscientific notions associated with its metapsychology, making room for a new set of values and identifications. This was not without some serious complications. The "widening scope" of psychoanalysis brought enormous changes in psychoanalytic theory and in clinical practice, and deeply affected the self-image of psychoanalysts by the traumatic deidealization of Freud and some of his propositions that, for a long time, had been taken for granted. It was not only the metapsychology
that was discarded, but also Freud’s clinical theory that became the object of criticism and of efforts to redefine it. It is outside the scope of this essay to review all the theoretical and clinical propositions associated with this historical period in contemporary psychoanalysis. In this essay, I focus on how the term knowledge has been disavowed in psychoanalysis, especially when defined as the product of direct observation, experimentation, and rational thinking, and the pervasive need to declare ignorance that has dominated the field as a result of it. It took a long time for analysts to realize that women’s wish for the penis, masculine protest, and men’s strivings against passive-feminine urges do not constitute the bedrock of all psychological strata, as Freud (1937) declared. Slowly but inevitably it became evident that certain developmental issues play a decisive role in most analyses, and that the analyst’s capacity to address them determines the success of the whole enterprise. In the beginning the “pregenital” issues were considered obstacles analysts had to overcome to engage their patients psychoanalytically, but gradually it became evident to most analysts that oedipal issues are only one aspect of the patients’ pathology, and that analytic treatment must address issues in the patients’ pathology that are a good deal more archaic in origin. The different schools of psychoanalytic thought offered a wide range of speculative and largely untestable propositions about the nature of these archaic is

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issues and the approach to their cure. Melanie Klein (1926) identified oedipal issues in the first year of life, but most others focused on the mother-child dyad in an effort to trace back the origins of the pathology. However, the patient’s associations in the clinical situation provide insufficient data upon which reliable assumptions can be made about what happened and why during the preverbal and presymbolic steps in development. To compensate for that, many analysts began to direct increasingly more attention to their own
subjectivity as an instrument in understanding the communications of their patients.

Gedo (1986) alerted psychoanalysts to the risks involved in assuming the presence of unconscious meanings when, more likely, none are there, and in using the analyst’s subjectivity as the basic reference point for understanding the patient’s communications. His message has had a hard time in coming through to those psychoanalysts who have been swept away by a strong wave of modern day romanticism about intersubjectivity and the associated cynicism about the data of consciousness and all efforts to establish reliable facts. Under the circumstances, those who claim ignorance, cognitively speaking, are presumed to be the knowledgeable ones, whereas those who assert their knowledge and expertise are considered naive and ignorant.

There is, of course, a long philosophical tradition going back to Plato and Socrates which emphasizes the importance of recognizing man’s ignorance. The postmodern cultural trend, however, the steps of which many contemporary psychoanalysts are following, has very little in common with classical Greek philosophy, which viewed the world as an ordered expression of primordial forces and ideas.
The romanticism to which I have referred is evident in the psychoanalytic propositions of object relations theories, of self psychology, of the hermeneuticists, of the constructionists, and of Lacan's theories, as well. All these theories implicitly or explicitly emphasize a loosely defined communication between the unconscious processes of the analyst and those of the analysand that goes well beyond what can be documented by the data of consciousness.

The unconscious in object relations theories resembles a secret theater stage on which the individual interminably reproduces a more or less obsolete play that was originally written in childhood. Sandler and Rosenblatt (1962) were the first to introduce this metaphor. The characters on the stage represent the child's various internalized objects, and the play is a replica of early transactions with the caretakers. In this schema the analyst is gradually seduced by the patient to become part of the unconscious drama through a mechanism first described by Melanie Klein as projective identification.

The psychoanalytic reader is well aware of the extensive nature of the psychoanalytic literature on projective identification, the complexities of which I do not address in this discussion, except to remind the reader that the role of the
analyst in projective identification is conceptualized as that of a recipient of the patient’s demands to reenact an unconscious drama, as a result of which the 158 Knowledge and Ignorance in Psychoanalysis analyst’s unconscious is mobilized in compliance with or in defiance of the patient’s demands. According to these theories, it is the analyst’s self-analytic inquiry that will provide the crucial clues with which to decode the patient’s unconscious communications. Kohut’s propositions about the role of empathy in psychoanalytic treatment are in some respect consistent with the concept of projective identification. By defining empathy as "vicarious introspection," Kohut (1959) also conceptualized the analytic situation as a dyad in which the analyst places his or her subjectivity, and the unconscious processes associated with it, in the service of the patient’s needs and demands. How reliable is the analyst’s subjectivity in the understanding and uncovering of the patient’s unconscious aims? How is it possible for the analyst to accurately differentiate between subjective responses that were produced by the patient’s communications and those that are not necessarily related to them? Furthermore, can the analyst forfeit, at will, some of his or her own selfish considerations, in order to place his or her internal world into the service of the patient’s treatment? Only a generous dose of poetic license could have made such propositions so persuasive to so many good analysts. There is a different kind of romanticism in the propositions of those who advocate that psychoanalysis is a hermeneutic enterprise and that the use of the term unconscious be limited to its descriptive meaning (Spence, 1982). In such theories the importance of the narrative is romanticized, and facts are debunked as unattainable. Furthermore, meanings extracted from the "here and now" (Gill, 1982) of the analytic situation replace the search into the depths of the patient’s unconscious. Many psychoanalytic writers of the post-Freudian era have used catching terms to appeal to their readers’ romantic disposition. Winnicott’s (1960) concepts of the "true self" and of the "holding environment," Bollas’s (1987) concept of the "unthought known," and Kohut’s notions about the self and about "empathic immersion" into the patient’s subjectivity, are examples of that. To be sure, Freud’s fundamental hypothesis about the unconscious is highly romantic too, and this accounts, partly at least, for its appeal, but Freud worked hard to help his readers move beyond their romantic temperament and to engage them in a scientific
examination of the mind that was empirically and epistemologically sound. Romanticism and its counterpart, the scientific revolution of the Enlightenment, represent two distinct cultural trends, two temperaments that have their roots in the Renaissance, with which they have a lot in common. They both rebelled against oppressive forces, against religious dogma and superstition, and are 'humanistic' in nature, in the sense that they are attentive to human needs and indispensable in the study of human nature. They have, however, some very deep differences in the ways by which they approach their task. In describing these differences, Richard Tamas (1991) writes:

GEORGE MORAITIS 159 The Enlightenment's scientific examination of the mind was empirical and epistemological, gradually becoming focused on sense perception, cognitive development, and quantitative behavioral studies. By contrast, beginning with Rousseau's Confessions—the modern romantic sequel and response to the Catholic confessions of Augustine—the Romantics' interest in human consciousness was fueled by a newly intense sense of self-awareness and the focus on the complex nature of the human self, and was comparatively unconstrained by the limits of the scientific perspective. Emotions and imagination, rather than reason and perception, were of prime importance [po 360]. The geniuses to be celebrated by the Enlightenment temperament have been

Newton, Einstein, and the pioneers in medical sciences and, more recently, of

space exploration. On the Romantic side, Goethe, Schiller, Rousseau, Keats,

Byron, Pushkin, and Thoreau are some of the leaders that emerged during the

eighteenth and nineteenth centuries. The one group is admired for their rational

intellect and their power to explore the laws of nature; the other, for their cre

ative imagination, emotional depths, and capacity for self-expression and self

creation. Freud came to symbolize the bridge between these two temperaments,
and maintaining that bridge constitutes, for most analysts, the "Fusion of Science and Humanism" upon which the whole psychoanalytic enterprise rests. What is described as a fusion or as a bridge is, in its essence, a balancing act, which during the Freud years was maintained primarily because of Freud's capability to operate in both of these two modes of creativity. Freud was both a scientist and a romantic, a true Renaissance man who could combine the two temperaments despite their contradictions. Following his death, a concerted effort was made, in the United States, to cultivate Freud's scientific temperament through the propositions of ego psychology and the affiliation with the medical profession. Gradually, however, the concept of the "ego" was romanticized and made synonymous with that of the "person," as a result of which it lost its scientific value as an explanatory proposition. Simultaneously, Freud's metapsychological propositions lost their credibility and, along with them, the capacity of psychoanalysts to claim a place in the world of science. The balancing act Freud so carefully maintained could no longer be sustained, and there was a call from many directions to abandon the claim for a scientific status of psychoanalysis. In their eagerness to avoid being identified as pseudoscientists, many psychoanalysts embraced Romantic theo
ries without realizing the danger of becoming pseudopoets as opposed to pseudoscientists. It is important to take into account that the Romantic movement of the twentieth century has undergone substantial changes from its counterpart in the eighteenth and nineteenth centuries. In a way, in Thus Spoke Zarathustra, Nietzsche (1883) personifies this change with his claim that God is dead, that truth must be created rather than found, and man has to invent himself anew and will his 160 Knowledge and Ignorance in Psychoanalysis existence on the chaos of a meaningless universe without God. In this postmodern era of Western culture, the Romantic love for beauty, nature, and eternal truth has been replaced by the individual’s sense of entitlement and the cynical denouncement of those who aim to discover an orderly universe with its laws and structure. Never before in the history of science have discoveries been made at a more rapid pace, both in the understanding of human nature and in the world that surrounds it, but it seems that Western culture is deeply conflicted about it. Mankind is in a state of awe in view of the progress made, whereas, on the other hand, every effort is made to debunk these discoveries and render them meaningless. Not all psychoanalysts gave up their commitment to the Weltanschauung of science. Throughout this period, Gedo maintained his conviction about the biological basis of psychoanalysis, and anticipated developments in the interdisciplinary field long before they became established facts. His contributions aimed to restore the balance between science and humanism in psychoanalysis, by reinforcing the capacity of psychoanalysts to think as scientists and deal with the input from allied fields. The hierarchical model of the mind, first introduced by Gedo and Goldberg (1973) and further refined by Gedo (1991), is a scientific organizational schema designed to guide the psychoanalysts who feel lost in the labyrinth of competing explanatory propositions and therapeutic approaches. Within the bounds of this explanatory map, no theoretical or clinical psychoanalytic model assumes a monopoly. Instead a conceptual ground is offered, within the bounds of which the psychoanalytic clinician can use different theories to deal with different sets of empirical data. Furthermore,
the map is offered not as the final map, but as a conceptual reference that can accommodate "an infinite set of potential variables." Inevitably the hierarchical model reduces all major psychoanalytic theories into components of a larger conceptual schema and defines different therapeutic modalities for different types of pathology. Gedo challenged the hegemony of interpretation as a therapeutic tool, and introduced pacification, unification, and optimal disillusionment as psychoanalytic modalities equal to interpretation. In doing so he went a long way in making the analytic instrument more scientific in its applications. The proliferation of studies in human development provided new venues for the investigation of early developmental events. These studies constitute the "objective" approach, because it is the investigators' observational capacities that are being utilized rather than their subjectivity. On the basis of these observations, a series of hypotheses about the nature of the infant's subjective experiences and cognitive development have been advanced. Inevitably, all these observations are made from "without." There is no way for infants to provide us with a view from within.

GEORGE MORAITIS 161 Accordingly, the studies in child development have facilitated to a degree the analyst's awareness that subjectivity as a perceptual and therapeutic instrument does not suffice in mastering all the complexities involved. Psychoanalysts' in vestigations must also rely on the sensory impact and rationality, not only of their own, but also of those who have provided the relevant research data. The resistance among psychoanalysts to the input of data generated by genet ics and neuroscience is by far stronger than that to data provided from other sources. The fact that many of Freud's hunches and propositions resonate with recent findings of neurobiology hardly reassures the great majority of psycho analysts, who seem to view the new discoveries more as a threat than as a prom
I have no statistics to support this statement, but in reviewing the contents of publications, the programs of conferences, and several private professional exchanges, I have the distinct sense that the claims of neurobiologists have made psychoanalysts feel invaded and outflanked rather than helped and supported. There are, however, indications that changes are under way. This is evident in the increasing number of articles published in psychoanalytic journals on the applications of neurobiological data to psychoanalysis and the emerging interest in psychoanalytic research. Psychoanalysts cannot easily dispute data about which there is more or less a consensus among neurobiologists. One of the major difficulties in integrating such data into the psychoanalytic data base concern that the autonomy of psychoanalysis as a profession will be compromised. Certain statements made by senior researchers, such as those of Gilbert, which I quote in the beginning of this essay, and of Francis Crick in "The Astonishing Hypothesis: The Scientific Search for the Soul" (see Solms, 1997), seem to support the notion that, in the minds of these distinguished researchers, introspective data are no longer needed. Some others, like Wilma Bucci, take psychoanalysis very seriously. In her recent publication (1997), she introduces her multiple code theory as the new psychoanalytic metapsychology. Regrettably
have contributed so much toward this goal. Furthermore, she presents an em
pirical study of the analytic process without soliciting the reflections and com
mentaries of the analysts who collaborated with her in collecting such data. I believe that psychoanalysts have some good reasons to be concerned that cognitive psychologists and neuroscientists are inclined to overlook or bypass the importance of introspection in their research activities and data collection.

This, however, should not deter psychoanalysts from searching for ways to col laborate with neuroscientists and make every effort to develop mutual trust and respect. A more serious obstacle in pursuing such aims pertains to the fact that, by and large, psychoanalysts have neither developed nor embraced the scientific temperament, which takes the empirical world on its own terms as fully real, and which makes rationality and logic the foundation of knowledge. Freud systematically attempted to provide a scientific basis for psychoanalysis, but, for most psychoanalysts, the world of science is more of a Romantic concept than the everyday reality of their professional life. The Romantic element in psychoanalysis, which was already strong while Freud was alive, became dominant following his death. By emphasizing the Romantic element in contemporary psychoanalysis, I do not imply that psychoanalysts are poets at heart. By and large, psychoanalysts are neither research scientists nor scholars in the humanities. Their basic considerations are practical ones and pertain to their concerns about being able to effectively respond to their patients' communications and maintain their self-esteem, reputation, and income as professionals. Although they may be deeply affected by the Romantic nature of contemporary
psychoanalytic theories, it is primarily the directives and the instructions that they value, because it is only through them that they can place themselves a few steps ahead of their patients in the clinical situation. Thus they may wear the hat of the scientist or the hat of the poet, depending on what seems to work better for them in their clinical practice. The more gifted individuals within the psychoanalytic community operate well beyond such boundaries and struggle to develop new psychoanalytic concepts by testing the boundaries of psychoanalysis with allied fields of endeavor. How successful they become as the leaders within the psychoanalytic community largely depends on their capacity to translate their ideas and findings into relatively easy to comprehend theoretical propositions and clinical instructions. Freud was very successful in being able to operate at several levels of sophistication while promoting his theories and recommendations. Klein provided clinicians with very direct and uncompromising instructions. To an extent, Winnicott (1951), Kohut (1971), and Kernberg (1975) have tried to do the same, but gradually the widening scope of psychoanalysis made it very difficult to simplify theories and the clinical directives that derive from them. In the beginning of psychoanalysis, the therapeutic aim was a relatively simple one: to uncover the pathological fantasies and the repressed ideas associated with them. Psychoanalytic theory provided the clinician with clear expectations about the nature of these fantasies and where to find them. Ego psychology made the clinician’s task considerably more complicated, but many of the complexities were bypassed by a careful screening designed to eliminate the "unanalyzable patient." Within the bounds of the "widening scope," the aim of psychoanalytic treatment has become much broader. It has taken the form of a reeducational process without clear boundaries, which clinicians experience as a long and arduous effort to reparent their patients. Given the complexities involved, no clear directives or formulations are possible. Instead, psychoanalysts are offered a variety of choices provided by several competing schools of psychoanalytic thought...
without clothes" who
has abandoned his subjects to the darkness of ignorance. This has been further
facilitated by the dramatic drop of the number of people who seek psychoanalytic treatment and the cultural climate of our times. I believe that there is an urgent need in psychoanalysis for an ordered, comprehensive, and easy-to-grasp conceptual schema, based on certain testable propositions. Furthermore, such a schema should be able to provide some clear clinical principles and directives, the efficacy of which should be under continuous scrutiny. Can the data from neurobiological research help psychoanalysts to develop such a schema and to monitor its effectiveness? Gedo's work has provided many indications that this may very well be possible. However, all major propositions in psychoanalysis, if they are to take hold and become the way to define and practice the profession, must appeal to the rank and file of the psychoanalytic profession. To achieve that they must be presented simultaneously at different levels of sophistication and be encoded in clear principles and directives, along with the rationale for using them. So far all efforts made to introduce neurobiological research in psychoanalysis have followed two paths. In one of these, the findings of neurobiologists are presented in the simplest possible terms, whereas, in the
other, parallels and connections are drawn between these research findings and Freud's original propositions in an effort to illustrate the correspondence between the two. It is very unlikely that such approaches will be of great appeal to the rank and file among psychoanalysts. By and large psychoanalysts are illiterate in neurophysiology and neuroanatomy. Those psychoanalysts who are physicians hardly remember their references in these areas, and there is an increasing number of psychoanalysts who have never had such an education. Only those few individuals who are seriously prepared to reeducate themselves can do justice to the data presented. The correspondence between Freud's propositions and neurobiological findings is likely to generate some nostalgia and comfort among older analysts who may feel that, at long last, they are vindicated; but the majority of younger analysts have little regard or interest in Freud's original propositions. It is very unlikely that a second Freudian revolution will be instigated in our culture by these means. I think psychoanalysts should guard against such romanticism. My limited knowledge of contemporary neurobiology does not provide me with the ability to express a professional opinion about the extent to which the knowledge gained can advance psychoanalytic theory and clinical practice. What
has been demonstrated to my satisfaction is that certain psychoanalytic proposi
tions may be confirmed, refuted, or expanded on the basis of the new knowledge

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Winnicott, D. W. (1951), Transitional objects and


Freud (1896, p. 204), once wrote a passage illustrating, without realizing it until years later, that his own strongly held theory about seduction was seriously distorting his interpretation of the clinical psychoanalytic data (Sadow et. al., 1968).

Even Ernest Jones wrote on this occasion that Freud's efforts showed "less psychological insight than we are accustomed to ... [from him]" (1953, p. 264).

Yet if Freud, at the height of his creative powers, could err in this manner, imagine how much easier for most of us to succumb to errors of observation based on the intrusion of theory. As the great French neuropsychiatrist and teacher of Freud, Jean Martin Charcot, cautioned, theory is fine, but it doesn't keep facts from existing! This vignette provides an effective starting point for examining the vicissitudes of theory: what theory is about, what the word might mean and its history, and what makes theorizing and observing activities in analysis so treacherous for the unwary. My concept of "theory" makes use of an evolutionary, developmental perspective. I also attempt to link these thoughts about theory to the
work of John Gedo, especially his use of theory in his epigenetic model. The American Heritage Dictionary definition of theory is "a general prin
ciple, formula, or ideal construction offered to explain phenomena and rendered
more or less plausible by evidence in the facts or by the exactness and relevancy
of the reasoning." A second definition in the same source is "a hypothesis of
ferred on the basis of thought on a given subject; loosely, any idea, guess, etc. put
forward to be accepted or rejected in seeking the explanation of some condition
or occurrence." Implicitly and explicitly, both these definitions suggest a close
connection between theory and evidence. Yet it is at this interface that many of
the problems specific to our field occur, as I attempt to describe. As a general rule, analytic theories seem to linger on long after contravening
evidence has been discovered and become well known. In this regard, Freud was
not systematic about retracting his own erroneous theories, but rather did so 167 168 About Theory quietly (see Grinker’s introduction to Gedo and Goldberg’s Models of the Mind). Thus psychoanalysis has a tendency to add new theories much like some add new artwork to their living room, without regard to consistency or appropriateness. In other words, as specialists we seem to do better at uncovering the "relevancy of reasoning" or at describing syndromes than at working our analytic data to actually test and possibly disprove our underlying hypotheses. Few of our writers are skilled at using evidence in any way other than to illustrate theory, and our highly selected observations often overlook those aspects that do not fit the anointed theory. Why is theorizing in psychoanalysis so much more difficult than in other fields? A number of reasons immediately suggest themselves. First, our data of observation are "soft" and imprecise; a consensus is often
difficult to establish. We are not even entirely clear about what constitutes data. For example, a patient is a few minutes late and comments merely that this is because the bridge was up. Is the lateness the data? Or is only the meaning attributed to the lateness, that is, the patient’s spontaneous denial of the meaningfulness of this event, the significant data? If we say that only the uninterpreted act (which occurs outside the matrix of meaning) is proper datum, we are overwhelmed with a large number of acts that might be interpreted. Perhaps we should be forgiven, however, if our way of understanding is not congruent with "proper" scientific method. If we exercise our interpretive propensities, we are, after all, introducing a factor extrinsic to the item observed, namely, more than a bit of ourselves. This bit of ourselves necessarily includes a set of nascent theories or hypotheses about such things as lateness (at the clinical level); it also, of course, includes some intimate knowledge of our own feelings and behavior vis-a-vis particular situations and patients. Thus, we may ultimately interpret that the patient is late because of some fear of closeness to us, or as something that emanates from some concern of the patient, which may not be so obvious, such as a less than conscious feeling of irritation or anger toward us. In doing so we might justify our interpretation to ourselves by means of a belief that we have discovered evidence of some awkwardness in closeness, or some vengefulness in the patient in the past, or what we read as anger on his or her part. Or perhaps we see the patient’s lateness as part of a subtle attempt at seduction associated with both a wish and a fear, apropos of the earlier reference to Freud’s work at the time of his concern about seduction. We might still not be so sure, however, that, like Freud in 1896, we could be abusing the patient’s innocent act by the intrusion of a theory at a point where continuing observations might be more appropriate. The problem as a practical matter is that we cannot really know if we are right or wrong when we interpret anything. In a nutshell, we cannot even make a useful observation in any clinical psychological arena that does not take into account our self as observer as a most significant contributor to the field being observed. Analytic data are really, much more than in the other sciences, an amalgam of material provided both by the patient and the analyst. Note here that
I am not making reference to psychopathology on the part of the analyst (al
though this can also occur easily enough). Clearly, even nonpathological counter
transference distortions significantly complicate what we observe and how we
respond. I have no doubt that such distortions occur in the "hard" sciences as
well, but less frequently. However, in our field, even when the observations are
reasonably free of actual countertransference distortions, the observer remains,
as always, part of the data. For example, in "The Two Analyses of Mr. Z," Kohut (1979) became aware
by the time of the second analysis (or better, the second interpretation of his own
life, because it is now well known that Kohut was himself Mr. Z) of a whole
range of psychological phenomena of which he had not previously been aware.
Thus his "second analysis" appeared to address almost a different individual
entirely. Yet we cannot assume that the new bits of data were not present during
his earlier treatment. Personality and history are too consistent for that to be
true. A better hypothesis would be that, as a consequence of his continuing work
with others as well as with himself in his continuing self-analysis, Kohut be
came aware of data that were present all along but which he had previously been
unable to observe or assimilate. It seems that this
difficulty in learning was the result of the absence of a theory with the power, so to speak, to take decisive bits of data into account. And the absence of such a theory was in turn due to Kohut's not yet having completed enough self-analytic work to enlarge his perspective and permit him to enlarge psychoanalytic theory more generally. The fact that both analyses were of himself would appear to support my conclusion that it is both theory and personal development that permit new perspectives. So much for difficulties with data. A second major dilemma for theorizing pertains to the shifting way we define words. In a field without mathematical precision, definitions of important terms tend to take on meanings that vary with the specific epoch of theory formation, with the school of the contributor, or with the purpose for which the word is intended. Take the word ego, for ex ample. It initially referred to something synonymous with consciousness. Freud later focused on ego as a mediator between inner forces and the environment. Not many years later, however, it became clear to some of his followers, most notably Heinz Hartmann, that Freud had been using ego in two rather distinctly different senses: (1) as something close to today's concept of self, and (2) as a more general agency of mind. Gradually ego came to mean more fully an agency
of mind coordinated with id and superego-this was the ego of the structural hypothesis. No sooner had this become fairly well established than the definition shifted again, this time taking on meaning in terms of its contents, that is, the term expanded to include a whole gamut of functions, including psychological defenses, motor functions, and memory. Moreover, at the same time ego About Theory moved from a static concept within the confines of the therapeutic hypothesis ("where id was, there shall ego be") to a concept with important genetic roots. In other words, ego took on an increase in level and range of consciousness. Thus the changes in the concept of ego invited further concerns in psychoanalytic "culture" about the relationship between genetic loading for various capacities and environmentally determined inputs, such as the adequacy of parenting, which can play a releasing role in development. Moreover, if such words as ego can become yoked to questions about nature and nurture, how many other complex variables-known or unknown--can alter its definition further? If this is disadvantageous for a science, however, there may also be an advantage in allowing a certain degree of looseness of definition of terminology as fields are undergoing rapid advancement. Still another problem in developing theory in our field is the general dependence of psychological theory on cultural and technological factors that serve as metaphors which guide our thinking. Freud's energy theory did not arise merely out of the data of psychoanalysis. From its outset, drive theory emanated from Freud's knowledge of the theories of nineteenth-century science, including physics and biology. But as the physics and biology in particular evolved, any psychoanalytic theories depending on these domains required adjustment if they were not to become obsolete. On this basis, drive theory (e.g., the concept of energy cathexis) lost its support and was eventually supplanted by the notion of information distribution. My purpose here, however, is not so much to describe the specifics, which are already well known, but to distill out what I see to be the core difficulty for theory change: that mere metaphors which can originally assist novel thinking fail if they do not contain some significant measure of truth, or if they are not themselves inviting change. Put differently, when
we do not really understand something, what is appealing about theory is the creation of the illusion of understanding. But unless a theory is being created in relation to reliable observations, then theory cannot but rapidly degrade into a rigid system of belief. Such has been the case with some psychoanalytic theorizing, which has failed to attempt any integration of contemporary psychology and biology. As Gedo has pointed out, for a theory derived from an extraneous field to be useful, the data derived from such a field must be congruent with psychoanalytic data. That is, if the data which emerge from studying the brain and the data of psychoanalysis inform each other, then the borrowed neuroscientific theory is more than a metaphor, and offers something of genuine value. Although the serious study of the interplay between psychoanalysis and biology is only a couple of decades in the making, the data from these two fields have already become sufficiently congruent that theoretical advances reflecting this congruence are becoming increasingly evident (Gedo, 1988, 1993, 1995, 1996; Levin, 1980, 1991, 1995a, 1995b, 1995c).

Today we continue to lean heavily on the intellectual surround for our theories. As our culture has gradually shifted emphasis from gross mechanistic concepts to those of organization, self, individualism, and process, so too has there been a shift to the same subjects within psychoanalysis. Thus we think about emotional and textual interaction between patient and analyst, and as one might expect, such theories are much more individualistic. We also tend toward larger numbers of seemingly unrelated theories, each with a special, narrowly focused language and a small group of adherents who tend not to communicate much with the adherents of other theories. The somewhat less successful attempts to introduce systems and information theory, neuroscience, and hermeneutics into the
psychoanalytic corpus are examples of conceptual borrowings which have added a richness to our language and to clinical understanding. As with the original borrowing of the energy concept from physics, however, these contributions are not intrinsic to the analytic data base and therefore less able to establish falsifiable hypotheses in the ordinary scientific manner, although they can be suggestive of significant tests of validity and of patterns that require analytic inquiry. These comments on the limitations of borrowing should not be taken as anything but constructive criticism because it is impossible to imagine psychoanalysis progressing without nurturance from sister sciences, just as, in fact, psychoanalysis itself nurtures these other fields considerably. It does mean, however, that cautions need to be observed: what is borrowed cannot be treated identically with a theory derived from evidence based on analytic clinical experience.

It would be more correct, therefore, to define borrowings exactly the way Freud did, as metapsychological: contributions that derive from beyond the core clinical base of our field. From Freud's perspective, such metapsychology is an important intellectual scaffolding which we must nevertheless be ready to discard or update without hesitation. One further point on the evolution of theory, and a related danger. There is
reason to believe that there are two different modes of psychoanalytic thinking (Sadow, 1984), one generative and the other patterning. When operating in the generative mode, analysts make use of introspective, empathic, and intuitive qualities of thought. In this mode the analyst is most closely tuned to the fine nuances of affect and cognition in both patient and self. In the second or patterning mode, qualities of logic and rationality are the primary organizers. We learn to use the generative mode when we are with our patients, and the patterning mode when we are reflecting on the experience afterward. Obviously scientific endeavors would need both modes. But what I wish to highlight here is the danger associated with the undue intrusion into the observational field of the patterning mode. Because theories are organizers of perception, and the need to organize is ubiquitous, analysts are perpetually at risk of interpreting too much or too quickly, 172 About Theory by which I mean, interpreting for the purpose of finding patterns that reduce their own discomfort or what they perceive to be the patient’s discomfort. Put differently, explanatory comments to patients, even not entirely correct explanations, appear, at least temporarily, to help control the disorganization associated with novelty or frightening feelings (Moraitis, 1986). The pell-mell rush to interpret the patient’s motives, feelings, actions, and so on may thus serve a defensive purpose rather than the goal of enlightenment. The by-products are complex: They include the creation of the mere illusion of insight. They also can perturb patients by confusing them about motives which they are otherwise in the process of finally understanding more accurately. Before the scientific era,
learned individuals made pronouncements that were akin to contemporary theories. As noted earlier, not to understand is, at a minimum, discomforting; for this reason historically myths and religious beliefs had been created. A flood was no longer as bewildering if it was understood to be a response by the gods to some perceived transgression by mortals. Religious beliefs, of course, also provided a sense of community, just as scientific societies provide in the present day. From an evolutionary perspective, the anxiety associated with primitive beliefs further provided a means of alerting society to danger. In effect the dangerous and confusing world was assuaged by one in which a magical order reigned supreme, and men became more powerful through their appeals to the supernatural. Today, in our scientific mode, we are unlikely to appeal directly to the supernatural for understanding how things work. Yet the powerful psychological forces that originated in ancient myths and beliefs in supernatural forces still are available to influence such things as religiouslike faith in contemporary science. And even today we see firmly held scientific beliefs of a most incredible nature utilized to explain and make order out of what to some must appear as a chaotic and frightening world. By the mastery of the situation in thought, and eventually in theory, we achieve a sense of comfort and order. In suggesting this psychological basis for theory making, I am of course implying something about "correctness," at least in the utility of particular theories in providing useful and testable explanations for particular phenomena. I am not, however, taking a position about what is ultimately "correct," but more arguing, as did Immanuel Kant about what is intended to be verifiable in a scientific sense versus what is not meant to be verifiable but rather a matter of belief (see Levin, 1995c). It should be clear from the foregoing discussion that the first and foremost purpose of scientific theory construction is to organize seemingly discrete bits of observational data into larger units based on meaningful, reproducible relationships among them. The critical word is meaningful. As in the earlier example of the patient who was late, there is a problem in explaining this lateness properly. If the patient is both late and angry, there may be a causal connection between the lateness and the anger. But any interpretation to the patient that he
or she is late because the patient is angry remains to be demonstrated, because

there are other explanations which cannot be immediately ruled out. One, for example, is that the anger is the consequence of the lateness. Without going into the very complex details required to properly understand the lateness, let it suffice to note that in my opinion, we need to be exceedingly careful with our interpretations in such cases, because of the dangers of overly influencing the patient into accepting our viewpoint(s) at the expense of his or her own.

Thus, if our favorite theory concerns transference, the connection between lateness and anger (in the example) would be seen as transferential; or if our favorite theory would be something other than depth psychological, then an unexpectedly open bridge may be seen as the primary explanation of the lateness.

Either way, however, we may feel compelled to get to an explanation, a theory that explains, or in our parlance, interprets the behavior of the patient, or we could withhold judgment and wait for that extra bit of information that would allow us to nail down the explanation. Although the cost of waiting to understand anything is some level of tension, waiting seems worth it to me. In other words a major abuse of the use of theory in our field is
rushing in to make clinical interpretations and foreclosing the admission of new contravening or clarifying evidence.

Once established, a theory becomes a powerful tool of perception. This is hardly an original observation, but its importance in clinical work cannot be overstated. Again, correctness or incorrectness in a given instance is less of an issue than the simple availability of the theory. A theory becomes established because it has some degree of correctness, but other tests must be employed to establish correctness. Just as with the data I discussed earlier, theory is some thing the clinical observer brings to the scene. We might say that, for some, a theory becomes simply a device of a quasi-personal sort that screens out extra neous, nonconforming stimuli and permits a focus on stimuli that fall into some preset pattern. And the pull to make sense out of disorganization sometimes forces a false order onto data, or a misperception of stimuli, designed to reduce to insignificance those stimuli that might not conform to the theory.

But that is not precisely what I mean by the phenomenon of theory as a tool of perception. The Freudian will be sensitive to certain aspects of the situation;

that is, he will perceive only some of the data; and the
self psychologist may be sensitive to a different enough array or conglomeration of the data, so that the two may appear, to a "neutral" or outside observer, to be perceiving quite different phenomena. That is quite aside from differing interpretations about a given bit of data when competing theories each take proper account of the same bit of data. It would then be hard to say what is more significant: the somewhat different set of data perceptually permitted by our two different psychological theories or the differing interpretations of a specific set of data by two different theories. My belief is that actually both views are important. An elaboration, however, is beyond the scope of the present discussion. Let me turn again to the question, what purpose does theory serve? As I have noted elsewhere (Sadow et al., 1968), at its best, the analytic process constitutes a creative endeavor evolving new structure, where previously there were developmental gaps, arrests, or pathological conflicts. It may be that new structure in this case means the literal establishment of new neuronal connections (Levin, 1991). In other words, the analytic process sets in motion a creative surge that operates beyond the transferences to work out some portion of the patient's life, where there had been relative emptiness. We do not know a great deal about this process, except that we have been witness to it in a number of patients. Moraitis (1986) has referred to this process in a larger context (beyond the therapeutic) as the pursuit of novelty. He believes that it can best be categorized as a form of learning by the active pursuit of enriching experiences, an idea with which I agree. Those individuals who are capable of assimilating and synthesizing quantities of new experience either to fill some gap in themselves or for some other, unknown reason, may become the creators of new theory. We have evidence from an investigation of Freud's theorizing that it was through his intense pursuit of his own unconscious mentation, his self-analysis, that he arrived at some of his clinical theories (Sadow et al., 1968). Theorizing then, at least some of the time (perhaps most of the time), is driven by the need to fill some gap in one's
self. In our field, if that gap has any universality, and if the theory that results does indeed have some explanatory value for a significant part of the population with which we come into contact, it is useful and becomes part of the tool bag of the community. If theory is merely idiosyncratic, however, it remains a curious idea of little consequence to others. To sum up, I have suggested three psychological purposes that theorizing may serve. First, it may reduce the discomfort of chaos and uncertainty by providing a sense of order or meaningfulness. Second, theory functions as a perceptual tool. On the positive side, this facilitates understanding by allowing us to take in more of the data potentially available. On the downside, however, it eliminates data that do not conform to the theory's constraints. So, theory inevitably enhances the preset pattern at the cost of some increment of progress. And third, theory provides a means to deal with conflict or deficit in the theoretician, to the potential advantage of others who are similarly affected. A life enhanced by a creative synthesis results in a feeling within that person of harmony, an inner beauty, a sense of healthy grandeur. So, too, with theory generally. If it truly meets a widely experienced but previously unarticulated need, it has beauty, harmony, and style. In this sense, theory in our field is no different from theory in other fields. Natural scientists also speak of certain theories as having eloquence, grandeur, and an esthetic quality.

LEOSADOW 175 I have also noted how we abuse theory. The vignette I quoted at the outset offers a striking example of such abuse. Freud had labored mightily to establish his early seduction hypothesis. A fairly elaborate set of etiologies for specific pathological sequelae suffered by the adult patient who had been seduced in childhood had been worked out. Freud did not yet know that most patients who had described childhood seductions were in fact merely describing their fantasies. Through his own self-analysis, he discovered that people responded to fan
tasies of nonreal events or to the memories of those fantasies as if they were real, and therein lay one cornerstone of psychoanalytic thought. But, in 1896, when he wrote on seduction, Freud knew only that patients responded profoundly to important childhood experiences. In this instance involving Freud, the abuse of theory was not merely in the error, which was, in fact, a most understandable one, considering the psychosocial ambience of turn of the century Vienna. The abuse was in Freud’s overriding the data at hand: in his rejecting evidence pro vided by particular patients and rather arrogantly insisting on the correctness of his theory. Theory was used in this instance as if it were actual data which took precedence over the data generated in the session, and not as a more or less tentative proposition always subject to correction or rejection. The substitution of theory for data is so sal that it might be instructive to think about what makes it come about. The information we call data is usually conceived of, incorrectly, as if it were entirely derived from external sources. Theory is the imposition of a previously established pattern of meaning on data. But the data, as we have seen, are them selves products of the theory, an amalgam of sorts between what is really out there and how those truly external registrations are worked
over in the mind of the observer by many personal factors. These factors include experience, taste, memory, personality, conflict (psychopathology), and, perhaps most significantly, the previously established theory itself. Thus the data, once they have become data, stand rather close to the theory as a figure not highly distinguished from background. Even if nothing else motivated one to conflate theory with data and substitute the theory for the data, the intellectual effort involved in keeping them separate is considerable: it requires nothing less than continuous self-scrutiny. There are other reasons for confusing theory with data. It is reasonable to assume that, for Freud, the understanding and clarity gained by organizing the data, or the apparent data, according to his theory must have been quite gratifying. He was able to move beyond the level of Kraepelinian classification to the beginnings of a theory of the etiology of mental illness. We can imagine the gratification he must have experienced at this conquest of uncertainty and confusion. The fact that he was at times in error was insignificant as compared with his achievement at arriving at an explanation for complex psychological phenomena that made sense. To have allowed his patient to implicitly reject his theory would have been too painful in that he would have been forced back to
the prior level of etiologic confusion. This may be another way of saying that Freud had a narcissistic investment in his theory, and that to have this fruit of his mind challenged would have been a great blow. Rather than have one’s theory demolished, a little slippage in the interpretation of the data might have been a more acceptable compromise. Yet beyond the substitution of theory for data lies still another abuse of theory which I refer to as the substitution of ideology for data. This kind of substitution is far more difficult to deal with and far more divisive to the community than is the theory-data abuse, because it is based on strongly held, narcissistically charged positions. One might say that this should not even be considered as abuse of theory, as theory in the ordinary scientific sense is not involved. But it results in an abuse of theory, nonetheless, both because the intellectual issues are couched in terms of theory, and because the ideology stems most frequently, in our field at least, from old bypassed theories, themselves based originally on data acquired through the psychoanalytic process. The ideas of almost all major figures in the psychoanalytic firmament are, or have been, involved in such an abuse. For example, the theoretical power of the Oedipus complex, as created by Freud, to explain very important aspects of development, as well as of psychopathology, was so great that it came to dominate depth psychological thinking for decades. Gradually the theory of the Oedipus complex came to be seen by some as limited in scope rather than as the more or less universal explanation of all psychopathology. Those psychopathologies whose etiologies could not be understood as ultimately derived from preoedipal developmental sources were explained as resulting from a regression from the Oedipus. Or, to stretch the thesis a bit further, the Oedipus came to be seen as a kind of psychic funnel. All psychopathology would be understood to pass through the Oedipus and to be shaped by it, whether the problem in development stemmed from preor postoedipal sources. The fact that oedipal theory came to be modified in these ways was scientifically unexceptional. At the time these modifications were invented, there was not enough of a grasp of developmental considerations to do any better. And the theory of the Oedipus was still useful as an overriding construct. Moreover, as we began to understand early pathology-borderline, gender issues, very early disturbances in the mother-infant experience resulting in severe character pathology, and some forms of psychosis—disturbances related to the Oedipus proper were relegated to an ever smaller range of the
psychopathological and developmental spectrum, and the Oedipus was dethroned as the exclusive explanatory agency. It was at this point that, for some, the Oedipus became visibly ideological. No matter how great the number of clinical observations that could better be explained by other means, some adherents of what we might now refer to as the oedipal ideology (or mythology, as some suggest) insisted that the Oedipus complex was and would always remain the preeminent clinical psychoanalytic proposition. Those who deviated were sometimes treated as enemies rather than as honest workers with a different view based on different interpretations or different observations. Groups formed and loyalty was tested by degree of ideological purity. Such groups were based on age, geography, and attachment to one or another idealized figure. The abuse is not in the arguments for or against the centrality of the Oedipus; the abuse is in making an ideology out of a venerable, but old, somewhat limited theory. The Oedipus complex retains its utility, not as a universal explanation and a test of loyalty, but as an explanation of some developmental psychopathology.

The theory of the Oedipus complex is only the first in the field to have become degraded by some into an ideology. In more recent years, we have seen much the same fate befall the novel ideas of Winnicott, Mahler, Kernberg, and Kohut, to mention only the more prominent. Each of them made observations
and developed theories based on new observations—observations that were beyond the capacity of existing theories to explain. Just as with Freud, groups formed with powerful loyalties to the now idealized theorist and to his or her ideas. Unfortunately all too often the preeminent need, I believe, is for the safety and security provided by an attachment to an idealized figure in distinction to the insecurity of relative insularity and uncertainty.

These abuses of theory can be seen as regressive in that the analyst’s capacity to function at a high cognitive level is compromised when subjected to their influence. From one perspective theory can become, analogous to a transfer ence, something that has the potential for distorting reality.

I wish to conclude with a comment on where we are headed in terms of theory.

It has been almost a hundred years since Freud proposed a developmental schema or model for psychoanalysis. The original oral, anal, phallic progression served us well and was, with time and experience, refined and modified. In fact, it has been so modified that, except in college courses, we now hear little about it. But I believe it was not until 1973, when Gedo published his Models of the Mind with Goldberg, that it became possible to conceptualize the study of mind in an
organized manner. The system of hierarchical models does not fall if a particular
theory along either the horizontal or vertical axis is modified or even found to
be entirely faulty, because a successful assault on the concept of epigenetic de
velopment is presently inconceivable. It is not, as the authors suggest, a theory
in the conventional sense of theory, but rather a schema for the organization of
data, theories, and, potentially, all manner of research studies in our field. Gedo
is aware that no grand, all-encompassing theory is likely to become available,
just as he knows that we need not wait for the Messiah to help us straighten out
our theoretical quandaries.
Perhaps a better sense of the scope of the sets of hierarchical models would
be conveyed by calling the whole idea a model matrix. The hierarchical model,
It is not difficult to understand why the relationship between psychoanalysis and
neuroscience should interest us. Psychoanalysis is a science of the mind, and we
have known since ancient times that the activities of the mind are in some inti
mate way connected with the tissues of the brain. This connection was estab
lished, from the start, on clinical grounds. Physicians through the ages recog
nized that diseases of the brain—unlike those of any other organ—had imme
ate effects on the functions of the mind. The celebrated case of Phineas Gage,

which was first reported in 1848, is classically cited in this context (Harlow,

1948, 1968). A tamping rod passed through the frontal lobes of his brain, with

the following results: "His physical health is good, and I am inclined to say that

he has recovered ... [but] his mind was radically changed, so decidedly that his

friends and acquaintances said that he was 'no longer Gage'" (Harlow, 1868).

Observations such as these, which demonstrate that the brain and the personality

are inextricable, make it clear that the object of study in psychoanalysis is some

how intrinsically connected with the object of study of neuroscience.

Freud himself recognized this fact in his neurological writings, and he con

tinued to acknowledge it throughout his psychological writings. Nevertheless

psychoanalysis developed almost completely independently of neuroscience. We

all know the reason for this: Despite the fact that Freud acknowledged that 'the

mental apparatus ... is also known to us in the form of an anatomical preparation,'

as he put it (Freud, 1900, p. 536), he nevertheless always recommended that

psychoanalysts should remain aloof from neuroscience. There seems at first sight

to be a contradiction in this stance, but I will clarify Freud's position in a moment.
The mere fact that psychoanalysis and neuroscience developed separately for so long points to the reality that, notwithstanding the obvious connection between

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brilliance of some of their intuitions-has relied on the same fundamental methodology that Freud did regarding the actual manner in which they correlated the two fields, namely, speculation.

These are some of the reasons why we are now in a situation, with the sudden increase of publications in this area over the past few years, where we have a number of competing and in many respects contradictory models of the neurological organization of the deep mental functions we study in psychoanalysis, without us having any rational basis for deciding between them. How are we to decide between the rival points of view? I am sure you will agree that we ought to be able to decide such questions for, if the mind and the brain both function in regular and lawful ways, and if those functions and regularities are related to each other in similarly lawful ways-as we have every reason to believe that they are-then it should be possible for us to decide such questions in ordinary
scientific ways.

My primary aim in this essay is to introduce you to a method by which we can achieve this ordinary scientific task. I intend to do so, first, by telling you some thing about where this method came from; second, how it works; and third, by reporting very briefly some of the findings that this method is beginning to pro duce about how the deeper strata of the mind are organized neurologically.

To do that, I want first of all to take you backward into history, to trace the origins of psychoanalysis to a particular branch of neuroscience, and to show you how the psychoanalytic method grew out of that branch; then I want to trace subsequent developments in that field to show you that it still remains the natu ral point of contact between our two disciplines. In the process I hope to be able to demonstrate that—just as we find in our clinical work—a problem, which seems insolubly complex in its present, mature form, frequently turns out to have a relatively simple structure when one traces it back to its origins.

To start at the beginning, Freud began his scientific career as a neuroanato mist, before, following a brief flirtation with psychopharmacology, he turned his attention to the problems of clinical neurology. By the time that Freud came
to clinical neurology, it was still a very young discipline, which rested almost entirely on a single method. That method was known as clinico-anatomical correlation, which was carried over to the new specialty of neurology by some of the ablest practitioners of the art of internal medicine. As its name suggests, internal medicine concerned itself with the diagnosis and treatment of diseases occurring in the interior of the body, which could for that reason not be apprehended directly in the living clinical case, but rather had to be inferred from their indirect manifestations in the form of external symptoms and signs. One had to wait for the death of the patient, and the pathologist’s report, before one could determine conclusively whether one’s diagnosis was correct. But with the accumulation of experience over generations, regarding what sort of clinical presentation during life tended to correlate with what sort of pathological anatomical findings at autopsy, it gradually became possible for internal physicians to recognize pathognomonic constellations of symptoms and signs, and thereby to predict with reasonable accuracy what the underlying disease process was, and to conduct the treatment accordingly. This was the origin of the concept of clinical syndromes, a concept with which I presume many of you are familiar. Neurology became a separate specialty of internal medicine as it became increasingly evident, not only that the brain-like any other organ-was subject to its own special pathologies peculiar to its tissues, but also that damage to different parts of the brain produced a wide variety of different clinical manifestations. When Freud trained in clinical neurology in the early 1880s, this was the art that he learned: rational diagnosis and treatment of neurological diseases by the syndrome method, based on knowledge obtained by the
method of clinicoanatomical correlation. In fact, we are
told that Freud was a particularly gifted practitioner of
this art (Jones, 1953). He published a series of articles
at the time attesting to his skill. Now because, as I
said at the outset, brain lesions cause mental changes,
the clinico-anatomical method could be, and was, also put
to another use, namely, the localization of mental
functions. In the early 1860s, Pierre Paul Broca
demonstrated conclusively that disease in a particular part
of the brain produced a highly characteristic mental
symptom, namely, loss of speech. On the basis of this
clinico-anatomical correlation, Broca localized the faculty
of speech to that small part of the brain. Ten years
later, Carl Wernicke demonstrated that damage to a
different part of the brain produced a different mental
symptom, namely, loss of the capacity to understand
spoken language—and he too localized that function
accordingly. These two seminal discoveries were followed by
a rapid series of clinico-anatomical correlations in
regard to a variety of other mental functions, such as
skilled movement, object recognition, and even
"intelligence." On this basis a wide range of
psychological faculties were localized within a mosaic of
so-called "centers" on the surface of the hemispheres of
the brain. This was the origin of a subspeciality within
the neurological sciences known as behavioral neurology.
We know from Freud's writings of that time that he was
thoroughly versed in the methods and discoveries of this
exciting new branch of science. In fact there is abundant
evidence to suggest that the clinico-anatomical localization
of mental functions was a subject of special interest to
him (Freud, 1888, 1891, 189394). Clearly then, Freud was
aware, before he conceived of psychoanalysis, that

there was a well-established method by which it was
possible to correlate men
tal functions on a clinical basis with the functions of
particular parts of the brain.

But if that was so, it raises the question, Why did Freud
not use this method to
identify the neurological correlates of the psychological
processes that he later
discovered? And why don't we use it to do so today?
As I have said, Freud was an unusually gifted physician, and it didn’t take him long to master the syndrome method in his diagnostic work, and the clinico-anatomical method in his ongoing research. It also did not take Freud long to discover the limits of this method. He soon came to the conclusion that it was, as he put it, just "a silly game of permutations" (Bemfeld, 1951, p. 214). This is how it happened. Although it is true that the clinico-anatomical method was the only viable research technique available to the nineteenth-century neurologist interested in mental functions, it was in fact used in subtly different ways within two rival schools of neurology. In the Austro-German school, within which Freud was initially trained, the emphasis fell squarely on the anatomical side of the clinico-anatomical equation. According to this school, the primary aim of neurological science was not simply to recognize which syndromes correlated with which lesions, but rather to explain the mechanism of the clinical phenomena and thereby the corresponding normal mental functions—in anatomical and physiological terms. This approach reflected the broader ideals of the Helmholtz school of medicine.

In the rival, the French school of neurology, on the other hand, the emphasis
fell very much on the clinical side of the clinico-anatomical equation. Accord

ing to this school, which collected around the personality of Charcot and the

famous wards of the Salpetriere Hospital, the primary task of neurological sci

ence was not so much to explain the various clinical pictures, but rather to iden

tify, classify, and describe them. The following quotation graphically illustrates

the difference between these two ways of applying the clinico-anatomical method:

Charcot ... never tired of defending the rights of purely clinical work, which

consists in seeing and ordering things, against the encroachments of theoreti

cal medicine. On one occasion there was a small group of us, all students

from abroad, who, brought up on German academic physiology, were trying

his patience with our doubts about his clinical innovations. "But that can't be

true," one of us objected, "it contradicts the Young-Helmholtz theory [of vi

sion]." He did not reply "So much the worse for the theory, clinical facts

come first" or words to that effect; but he did say something which made a

great impression on us: ["Theory is good; but it doesn't prevent things from

existing"] [Freud, 1893a, p. 13].

This was one of Freud's favorite anecdotes.

As is well known, during his period of study at the
Salpetrière in the mid-1880s, Freud moved from being under the direct, personal influence of some of the leading figures of the Austro-German school of neurology to being under the direct personal influence of Charcot. This shift had a decisive influence on his thinking, and, in particular, on his attitude to clinico-anatomical localization. The reason for this shift was simple. Although the differences between the German and French schools of neurology complemented each other well in regard to most physical neurological disorders, with the one school emphasizing the anatomical and the other the clinical side of the equation, there was one group of diseases—considered at the time to fall under the domain of neurology—that threw the differences between the two approaches into sharp relief. I am referring to the neuroses, and to hysteria and neurasthenia in particular, where no demonstrable lesion of the nervous system could be found at autopsy to account for the clinical symptomatology observed during the life of the patient. This posed no serious problems for the French school: Charcot simply proceeded to describe the pathognomonic clinical syndromes of hysteria and neurasthenia as he had done with countless other "nervous" diseases. The neuroses were for Charcot, as Freud wrote at the time, "just another topic in neuropathology" (1893a, p. 20). However, for the German school of neurologists, the problem was well nigh insoluble. How was one to explain in anatomical and physiological terms the mechanism of a clinical syndrome which had no pathological-anatomical basis? As a result, some German neurologists, Freud’s teachers among them, developed elaborate speculative theories, whereas others simply declared that the neuroses were not fit subjects for serious scientific attention. If there was no anatomical lesion, there was no clinical syndrome. During the crucial period that Freud studied under Charcot, this was the subject that most preoccupied him. Initially Freud became a devoted pupil of Charcot, and upon his return to Vienna, he expounded his views whenever and wherever he could—much to the irritation of his old teachers. However, with increasing clinical experience, and under the influence of the English neurologist John Hughlings Jackson, Freud gradually began to edge away from Charcot and to develop a viewpoint which was rather unique at the time. Charcot was content merely to describe the clinical syndromes of hysteria and neurasthenia—on the assumption
that their pathological-anatomical correlates (which he believed had an hereditary etiology) would eventually yield to advances in microanatomical and other laboratory techniques. Freud, on the contrary, came to the view some time between 1887 and 1893—that an understanding of these clinical syndromes would never be found in pathological anatomy, or at least not by the method of clinico-anatomical correlation. He based this conclusion on two major observations, which he had first made in regard to another subject in neurology, a subject that had revealed to him the limits of the clinico-anatomical method. This subject was the problem of aphasia—that is, precisely the subject to which the clinico-anatomical method had first been applied for the localization of mental functions by Broca and Wernicke—20 or so years before. First, Freud (1891) observed that psychological faculties are complicated things, which have their own compound internal organization, and that these

faculties break down according to the functional logic of their own internal construction, not according to the structural laws of cerebral anatomy. The laws of psychological functional systems therefore need not have any direct relation ship to the structural layout of the nervous system. For this reason, Freud concluded, psychological syndromes need both to be described and to be explained in their own psychological terms. Freud’s second observation, closely related to the first, was the following: psychological functions are, in their essence, dynamic processes; they arise out of a complex interplay of more elementary component functions, and they are constantly restructuring and re adapting themselves to changing circumstances. Their physiological correlates

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can therefore never be localized within discrete anatomical centers; they must be thought of as processes—the dynamic resultants of interactions between the static elements of the nervous system. It is of crucial importance for us to note that Freud first made these observations, not with reference to hysteria or any other neurosis, but rather in a study of aphasia—that is, a syndrome that can only ever occur in the context of a definite brain lesion. In other words, these were conclusions that Freud arrived at while he was still a fully fledged neurologist. This is underlined by the fact that he quickly went on to make similar observations in regard to nonpsychological, but equally complex, functions of the brain. In his writings on the disorders of movement that occur in cerebral palsy, for example, Freud went out of his way to demonstrate that they could not be localized. In a series of monographs on the subject (Freud and Rie, 1891; Freud, 1893b, 1897), like in his book on aphasia (1891), Freud appealed to dynamic developmental factors, rather than static anatomical ones, to explain the various movement disorders in terms of specific breakdowns of the complex functional system that supports them. It was only later that Freud applied these principles to psychopathology.
between 1893 and 1900--which is when psychoanalysis was born. This is a fact of critical importance, because in the next section of this essay I want to demonstrate how these principles were subsequently developed and expanded within the field of neurology, and how a neuroscientific method for studying the cerebral organization of mental functions was eventually established on precisely these principles. That is obviously of central importance to us, in our quest for a method by which we may rejoin psychoanalysis with neuroscience. But before I move on, let me recap and summarize Freud’s standpoint. He trained in the clinico-anatomical method of localizing mental functions, within the Austro-German school of neurology, which emphasized the goal of physiological and anatomical explanation. Then he shifted allegiances to the French school, which emphasized the clinical side of the equation: the elucidation of pathognomonic clinical syndromes. He used this clinical-descriptive approach to make a number of highly valued contributions to neurology, first in studies of aphasia, then of cerebral palsy, and lastly of neuroses. In the process of doing this work, Freud rejected the clinico-anatomical method of localizing mental functions—indeed of localizing any complex functions—within circumscribed
anatomical centers. Freud was forced to conclude that the clinico-anatomical method could only be used to localize the most elementary functions, corresponding in the mental sphere to our primary sensory modalities (of vision, hearing, taste, etc.), but that it was quite impossible to localize the neurological or organization of whole mental faculties, which have supraordinate principles of organization based on their own internal construction, which constantly changes in the process of development, and in their adaptation to unfolding circumstances.

For Freud, such complex functions arise out of the dynamic interplay of a variety of more elementary functions. He concluded that we should conceive of this interplay as occurring between the elementary structures of the brain, and therefore forego the temptation to localize them within those elements themselves. It was obvious to Freud, schooled as he was in the art of meticulous clinical observation, that the essential factors in the etiology and mechanism of the neuroses arose out of complex dynamics of this kind, and that they could therefore never be localized. This led Freud the neurologist to generalize the conclusions that he had reached in regard to speech and language and voluntary movement to the whole mental field, and to write the following fateful words in The Interpretation of Dreams, which marked the final split between psychoanalysis and the clinico-anatomical method:

I shall entirely disregard the fact that the mental apparatus with which we are here concerned is also known to us in the form of an anatomical preparation, and I shall carefully avoid the temptation to determine psychical locality in any anatomical fashion. I shall remain upon purely psychological ground, and I propose simply to follow the suggestion that we picture the instrument which carries out our mental functions as resembling a compound microscope or a photographic apparatus, or something of the kind. On that basis, psychical locality will correspond to a point inside the apparatus at which one of the preliminary stages of an image comes into being. In the microscope or telescope, as we know, these occur at
ideal points, regions in which no tangible component of the apparatus is situated [1900, p. 536, emphasis added]. What Freud retained, however, and carried over into the new field of psychoanalysis, was almost everything else he had learned as a neurologist. That is, he continued to rely on the clinical-descriptive methods of the French school of neuropathology, with its special emphasis on the careful study of the individual clinical case, and the identification of regular patterns of symptoms and signs with particular pathological significance, and he continued to explain the clinical phenomena in terms of underlying natural forces and energies, as he had been taught to do by his original masters in the Helmholtz school of medicine. He also continued to believe that these forces and energies were ultimately some

how describable in physical and chemical terms. All that he abandoned was the notion that psychological processes, which have complex and dynamic functions, can be localized in discrete anatomical areas. Henceforth, rather than attempt to explain a clinical syndrome by correlating it with hypothetical damage to one or another anatomical region, as even Charcot did, Freud investigated the internal psychological structure of the syndrome and explained it by reference to a complex functional system, which he assumed to be dynamically represented between the elements of the brain. That is why Freud continued to acknowledge throughout his scientific life that the model of the mental apparatus that he devised to account for his clinical observations was a provisional construct, a system of functional relations which must be represented somehow in the tissues of the brain,
and that is why he
continued to insist that we in psychoanalysis should "not
mistake the scaffold
ing for the building," and so on. I am sure you are all
familiar with Freud's many
comments to the effect that psychoanalysis will someday be
rejoined with neuro
science. I want only to remind you that he always insisted
that this would not be
possible until neuroscience developed a method that was
capable of accommo
dating the complex, distributed, and dynamic nature of the
human mental pro
cess. I will readjust one quotation of this sort, written
in 1939, the year of Freud's
death: The psychical topography that I have developed ...
has nothing to do with the anatomy of the brain, and
actually only touches it at one point. [Freud is referring
to the primary sensory modalities of the perceptual
system.] What is unsatisfactory in this picture-and I am
aware of it as clearly as anyone-is due to our complete
ignorance of the dynamic nature of the mental process [po
97].

Until that was understood, Freud insisted, psychoanalysis
should continue to
investigate and understand the functional organization of
the mental apparatus
in its own terms, using a purely clinical method,
disregarding its anatomical
representation. This places psychoanalysis in a very
particular relationship to the neurologi
cal sciences. It places its fundamental assumptions and
basic method within a
well-established tradition in behavioral neurology, a
tradition that has always
been closely associated with the clinical-descriptive emphasis first promulgated by Charcot, and that, following Hughlings Jackson, has always rejected the notion that complex mental faculties can be concretely localized in the brain. I am referring to the dynamic school of neurology, which has been associated through the years with such outstanding physicians and theoreticians as Constantin von Monakow, Pierre Marie, Henry Head, Kurt Goldstein, Aleksandr Romanovich Luria, and, most recently, Jason Brown. The influence of this branch of neuroscience has waxed and waned over the decades. Currently it is increasing enormously, as functional imagery and computer simulation studies have revealed the fundamentally nonlocalizable and dynamic "parallel distributed processing" that underlies all mental functioning, and indeed all complex functions of the brain. The clinical emphasis of this branch of neurology, on the other hand, is on the wane; with the enormous strides that have been made in the use of technological auxiliary aids in medicine, the art of clinical judgment is no longer so highly valued, and the human factor in medicine is being lost. Ironically, one could say that psychoanalysis stands together with this branch of neurology as one of the last outposts of the great clinical traditions of internal medicine. The important point for our purposes (looking forward rather than backward) is that Freud carried over from neurology into psychoanalysis a basic methodnamely, the clinical-descriptive method, or the method of syndrome analysis as it later came to be knownand a basic conceptualization of brain-behavior relationshipsnamely, the antilocalizationist or dynamic conceptualization, which gives pride of place to psychological methods of analyzing mental syndromes, regardless of whether those symptoms have an organic basis. This method, and these basic principles, have determined the object of study of psychoanalysis, the way we go about studying it, and, most important of all, the sort of knowledge that psychoanalysis generates. Now if we wish to integrate
knowledge of this sort with knowledge about the brain, then our natural point of contact is with that branch of neuroscience which shares our basic assumptions, and out of which psychoanalysis grew, that is, the dynamic school of behavioral neurology—or neuropsychology as it later came to be known. If we try to relate our clinically generated psychoanalytical knowledge with knowledge about the brain generated by fundamentally incompatible methods, or by methods that Freud explicitly rejected, then we not only are confronted by the insoluble problem of having to rely on speculation (as I said before), but we also have to recognize that we may be doing violence to the basic premises upon which our discipline was built. I am sure you will agree—and this was always Freud’s most fundamental viewpoint on the matter—that there is little point in rejoining psychoanalysis with neuroscience, if it means that we have to abandon all that psychoanalysis stands for in the process. 2. What I would like to do now is describe to you one of the major developments that has occurred since Freud’s death in the branch of neuroscience out of which psychoanalysis arose, because I believe that this development provides us with a method by which we can rejoin psychoanalysis with neuroscience in a way that is compatible with Freud’s basic assumptions. During the early 1920s, a young Russian psychologist wrote to Freud to apply for formal recognition of a new psychoanalytical society he had formed, in the Eastern city of Kazan. This man was Aleksandr Romanovich Luria. Freud granted the recognition, and a brief correspondence ensued. A few years later Luria moved to Moscow, and joined the Russian Psychoanalytical Society. Over a period of about ten years, Luria conducted a wide range of psychoanalytic research; published a huge number of articles, monographs, and brief reports; and conducted clinical work in a local psychiatric hospital, including (it is rumored) the analysis of Dostoevsky’s granddaughter. Luria was drawn to psychoanalysis, he wrote, because it was the only branch of
psychology that was both solidly rooted in natural science and studied the living experience of real human beings.

However, the tide of political opinion soon turned against psychoanalysis in the Soviet Union, and by the early 1930s, fearing for his academic future, if not his life, Luria resigned from the Russian Psychoanalytical Society, abruptly ceased all psychoanalytic activities, and delivered a penitent speech in which he admitted to his ideological mistakes, namely, according to the party line of that time, that psychoanalysis "biologized" human behavior and ignored its social origins.

This was a surprisingly naive remark coming from somebody with so complex an understanding of Freud's teachings, but that was not the point. Interestingly there is evidence to demonstrate that Luria never gave up his private interest in psychoanalysis, whatever his public pronouncements. Consider for example a letter he wrote to Oliver Sacks in the mid 1970s, in which Luria described the verbal tics of a patient with Gilles de la Tourette's syndrome as an introjection into the superego of the father's punitive voice (personal communication from Oliver Sacks to the author, March 17, 1987).

It is also very striking, in view of the charge that psychoanalysis biologized...
human behavior, to observe what Luria did next (after resigning from the Psychoanalytical Society). He went to medical school, specialized in neurology, and then immediately set about studying the mental symptoms of his neurological patients. And his first piece of research in this field--his doctoral thesis in fact was on the exact same subject that was preoccupying Freud when he left that field some 40 years before, that is, he studied the subject of aphasia.

When Luria finally published the results of his efforts, in 1947, in a monograph in which he scrupulously avoided the name of Freud, he proposed a theory of the cerebral representation of language which was remarkably similar to the one that Freud had proposed in 1891 (Luria, 1970). I am skipping over the details here, but would like nevertheless to reproduce one brief quotation. Consider the striking similarity between Freud’s suggestion that we view the mind as a complex optical instrument in which psychical locality corresponds to an ideal point in which no tangible component of the apparatus is situated, and the following statement by Luria: “All attempts to postulate that ... ideas could be found in single units of the brain were as unrealistic as trying to find an image inside a mirror or behind it” (1987, p. 489).
However, Luria went a step further than Freud; and this represented the essential advance that he contributed to behavioral neurology, or neuropsychology, as he preferred to call it. An Integration of Psychoanalysis and Neuroscience Luria described his approach as a "neurodynamic" one. He used the following analogy to illustrate the principle: Most investigators who have examined the problem of cortical localization have understood the term function to mean the "function of a particular tissue." ... It is perfectly natural to consider that the secretion of bile is a function of the liver and the secretion of insulin is a function of the pancreas. It is equally logical to regard the perception of light as a function of the photosensitive elements of the retina and the highly specialized neurons of the visual cortex connected with them. [You will recall, this was the type of function that Freud believed could be localized.] However, this definition does not meet every use of the term function. When we speak of the "function of respiration," this clearly cannot be understood as the function of a particular tissue. The ultimate object of respiration is to supply oxygen to the alveoli of the lungs to diffuse it through the walls of the alveoli into the blood. The whole process is carried out, not as a simple function of a particular tissue, but rather as a complete functional system, embodying many components belonging to different levels of the secretory, motor, and nervous apparatus. Such a "functional system" ... differs not only in the complexity of its structure but also in the mobility of its component parts [1973, p. 27]. The same could be said of, for example, the function of digestion. Luria went on to argue that mental functions, too, can only be localized in this distributed, dynamic sense. In order to identify the different component parts which together make up the complex functional systems of the human mental apparatus, Luria devised a new method of clinico-anatomical correlation, known as "dynamic localization." The method works like this: If one wishes to identify the neurological organization of a complex psychological function, one's first task is to identify all the different ways in which that function breaks down with focal neurological disease in different parts of the brain. Luria described this first step as "qualification of the symptoms." One starts with each of the different ways in which the function under study breaks down, and then carefully explores the psychological structure of each of these symptoms, identifying precisely in what way
the functional system has collapsed in each case. This is
done by using psychological methods of analysis in
individual clinical cases. The second step in Luria’s
method is called “syndrome analysis.” That is, one
examines what other functions are disturbed, apart from the
primary function under scrutiny, in each case. Again one
relies exclusively on psychological methods of
investigation, and one seeks to clarify the internal
structure of these other, interconnected symptoms, in
order to learn what they have in common with the function
that is the primary focus of attention. In this way one
identifies a single, underlying factor which can account
for the full range of surface clinical manifestations.
Once you have identified the common underlying factor
producing a range of psychological symptoms, you not only
will have learned something about the

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depth psychological structure of the syndrome in question,
you also will have

identified the component function that is contributed by
the part of the brain that

is damaged in that syndrome. In other words, you will have identified the el

ementary psychological function of one particular part of
the brain. This is a

major advance. Once one has studied, by this method, the
full series of different ways in

which a complex psychological faculty breaks down with
damage to each part

of the brain, then one will have discovered its distributed
neurological organiza
tion, by identifying which parts of the brain contribute,
and in what way they

contribute, to the complex functional system subserving
that faculty as a whole.

One will not have localized that faculty in anyone part of
the brain, but one will

have identified the various component elements between
which, by dynamic

functional interaction, that psychological faculty is
represented. To my mind this method of Luria’s marks a
major step forward, because it

enables us to identify the neurological organization of
any mental function, no

matter how complex, without contradicting the fundamental
assumptions upon

which our own discipline was built. By this method, complex
psychological func
tions are still understood in their own, psychological
terms; their dynamic na
ture is respected theoretically and accommodated
methodologically; they are

not reduced to anatomy and physiology, although their
neurological distribution

is laid bare; and something new is learned about their
internal functional organi
zation. By this method a viable bridge is established
between the concepts of

psychology and those of anatomy and physiology and all the
other branches of

neurological science. I hope I have not made the
neuropsychological method of syndrome analysis

sound too complicated, because it really is very simple. I
truly believe that this

method represents the breakthrough that Freud was waiting
for. That is to say, I

believe that it enables us to chart the neurological
organization of everything

that we in psychoanalysis know about the structures and
functions of the mind. 3.

What I would like to do now is give you an example of how
this method—which
I am claiming is the natural point of contact between psychoanalysis and neuroscience--works in practice. I have chosen for my example a piece of research that I recently completed (Solms, 1997) into the neurological organization of a mental function that is of special interest to psychoanalysis. I am referring to the function of dreaming. Using Luria's method to study the dreams of 361 patients with neurological lesions, my research revealed that dreaming is disturbed by damage to six different parts of the brain. Let me first of all describe the primary effects on dreaming caused by damage to each of these parts of the brain. If the brain is damaged in the white matter of the mediobasal frontal region, or in the inferior parietal region of either hemisphere, the conscious experience of dreaming stops completely. This clinical fact tells us that the basic functions contributed by these three parts of the brain are fundamental to the whole process of dreaming, for when any one of them is damaged, the manifest dream is obliterated entirely. Why that should be the case is revealed in an analysis of the psychological syndrome within which the loss of dreaming is embedded. I return to that point in a moment. First let me describe the other ways in which dreaming is disrupted by neurological disease. If the brain is damaged in the ventral occipito-temporal region, then the conscious experience of dreaming persists, but the patient's dreams are devoid of any visual imagery. Strange as it may seem, patients with damage to this part of the brain have completely nonvisual dreams. (Cases have also been described in which only selected aspects of visual imagery are disturbed--such as, for example, color imagery.) If, on the other hand, damage is situated in the proximity of the temporo-limbic region, and if the lesion is accompanied by a discharging focus (that is, by seizure activity), then the patient experiences recurring, stereotyped nightmares. These nightmares stop if the seizure disorder is brought under control. Finally, if the damage is situated in the
frontal-limbic region (including the anterior cingulate gyrus and basal forebrain nuclei), the patients experience a massive increase in the frequency of dreaming; they sometimes experience continual dreaming; and they have great difficulty in distinguishing between dreams and real experiences. So these symptoms qualify the different ways in which dreaming can be disrupted by damage to the human brain. Now as I have said, in order to discover what the cause of the breakdown of dreaming is in each of these six instances, it is necessary to study the constellation of other psychological symptoms which accompany the changes in dreaming, following damage to each of these areas. This enables the investigator to isolate the elementary underlying factor, which is common to all of these symptoms, and which is therefore contributed by the part of the brain in question to the overall process of dreaming. So what are the six elementary factors that are contributed by each of these parts of the brain? Unfortunately, due to limitations of space I cannot describe the full richness of the psychological syndromes from which we have inferred these underlying factors. As a result I am going to have to oversimplify things somewhat. For expository purposes I can only say that an analysis of the psychological syndromes associated with lesions to the six areas of the brain concerned reveals the following basic factors: The mediobasal frontal white matter contributes a general motivational factor to mental functioning. The left inferior parietal lobule contributes a factor of quasi-spatial synthesis, which is fundamental for symbolic mental operations. The right inferior parietal lobule contributes a factor of concrete spatial representation. The ventral occipito-temporal region contributes a factor of revisualization, which is essential for visual mental imagery. The temporal-limbic region contributes an emotional arousal factor, and the frontal-limbic region contributes a factor of selectivity, or of selective activation and inhibition, which is essential for processes such as attention, reality testing, and judgment.

These six factors together make up the functional system...
of dreaming, or to

put it differently, the process of dreaming arises out of a dynamic interaction

between these six factors, which are contributed by six parts of the brain. An

analysis of the special structural and functional properties of these six different

brain regions, and of the dynamic relations between them, provides a basic sci

entific understanding of the anatomy and physiology of dreaming.

Finally, to arrive at a truly comprehensive account of the neurological orga

nization of dreaming, it is also necessary to study the component functions of

those regions of the brain which do not appear to be involved in the process of

dreaming. This simultaneously reveals which elementary functions of the hu

man mental apparatus are not involved in the psychological construction of

dreams. For the purposes of this essay, I will discuss just two of these regions I

believe are of particular interest.

The first of these is a core brainstem region, the mesopontine tegmentum.

Although damage to this part of the brain severely disrupts the process of REM

sleep, the conscious experience of dreaming persists in these patients. This sug

gests an unexpected dissociation between the physiological process of REM sleep

and the conscious experience of dreams (Solms, 1995,
This dissociation is confirmed by the fact that lesions in the forebrain regions discussed earlier, which lead to a complete cessation of the conscious experience of dreaming, have no effect on the physiological phenomena of REM sleep.

The other region of interest that I want to draw attention to is the dorsolateral frontal convexity. This part of the brain is enormously important for the executive control of waking mental life and of voluntary motor activity. However, damage to this region has no effect at all on the conscious experience of dreams.

This suggests, not surprisingly, that secondary process thinking and volitional motor activity have little to do with the process of dreaming.

Now if we take a step back and look at all of these factors together, we can arrive at a model of how the dynamic process of dreaming as a whole is organized in the tissues of the brain. On the basis of my research, I have proposed the following model, every detail of which is accessible to empirical verification, by a variety of neuroscientific methods.

It appears that dreaming is stimulated by an arousal process. The most common arousal process that stimulates a dream is the state of neurophysiological activation which regularly occurs every 90 minutes during sleep--namely, the
state of REM, which is activated by deep brainstem structures. However, this is only one of the many arousal phenomena that may trigger the process of dreaming—and it is by no means the essential one—for dreaming occurs quite normally without it. Another arousal process that can stimulate a dream is a focal discharge in the temporal-limbic region. However, this is a pathological arousal process, which cannot be bound by the dream process, and which therefore results in anxiety-dreams, or nightmares. The next important component of the dream process is contributed by a fiber pathway in the mediobasal frontal region. This region of the brain motivates appetitive interest in the world (appetitive interest is the term that modem neurobiologists use for what we would call "libidinal interest"). This region channels endogenous arousal processes in the direction of volitional motor activity. An arousing stimulus only triggers the dream work proper if it engages this quasi-libidinal brain mechanism. The mediobasal frontal cortex to which this pathway projects also inhibits appetitive drives, and, therefore, together with the selective structures of the frontal-limbic region, they deflect the arousal process away from the (dorsolateral frontal) executive and motor systems of the brain. These latter systems are inhibited during sleep. But if the brain is damaged in mediobasal frontal cortex and the frontal-limbic region, it seems that the inhibition of these motor systems breaks down, with the result that goal-directed motor activity is instituted, and normal dreaming becomes impossible. This conceptualization of the process is supported by the fact that patients with damage to this region of the brain have severely disturbed sleep. If the brain is damaged in the basal forebrain and/or anterior cingulate gyrus, however, the disturbance of inhibition is only partial, with the paradoxical result that there is an increase in dreaming and in dreamlike thinking. Next, assuming that there is a sufficient degree of frontal inhibition, the focus of the nocturnal arousal process shifts to the posterior systems of the brain, which regulate perceptual functions, and the higher spatial and symbolic operations, which are based on perception (inferior parietal and ventral occipitotemporal regions). This, then, becomes the primary "scene of action" of the manifest dream. Here the three other factors that I mentioned come into play: symbolization, spatial thinking, and visual mental imagery. Among these three factors, it appears that symbolization and spatial thinking are the
most important ones, for in their absence, dreaming again becomes impossible, and the whole process breaks down. Visual mental imagery is a less important factor, because the entire mental process of dreaming runs its course without it, the only difference being that the final conscious product is devoid of visual imagery. I am therefore inclined to place this factor of visual representation at the terminal end of the process of dream generation that I have described. This overall picture suggests that dreaming is a regressive mental process, both triggered by and dependent on nocturnal states of arousal. These arousal states are channeled and inhibited by the systems controlling goal-directed behavior. They are deflected away from the motor systems, toward the perceptual systems. The higher perceptual systems represent the arousal process in the form of symbolic and spatial syntheses, which are projected regressively onto the lower visual zones. In this way the state of sleep is preserved. If, however, the nocturnal arousal process is excessive, such as occurs with seizures or defective frontal inhibition, then this sleep-protection mechanism fails, and the dreamer is disturbed, either by anxiety or by the innervation of volitional motor activity.

What Luria's method reveals about the neurological organization of dreaming, therefore, is strikingly compatible with Freud's classical theory. Also, because of the centrality of dreaming in Freud's models of the mind, it provides us with a first foothold on the anatomical and physiological representation of some crucial psychoanalytic concepts, including aspects of the libido, censorship, sym...
bolization, topographic regression, and so on. Moreover, although I don't have time to go into all these details here, by identifying the specific tissues of the brain that are involved in the different psychological components of dreaming, it becomes possible to study the finer anatomical, physiological, and chemical correlates of that theory. That is why I am insisting that the method of dynamic localization provides psychoanalysis with a conceptual gateway to the basic neurosciences, and thereby to the enormous advances in knowledge which technological innovations in those fields have yielded in recent years. The potential benefits to psychoanalysis are so obvious that I need hardly enumerate them.

I hope that this brief and oversimplified example makes it clear enough how human mental functions are represented in the tissues of the brain, in the form of complex functional systems that arise out of dynamic interactions between a number of elementary component parts—just like an image arises out of the 2 For example, closer analysis of the anatomical data reveals that the structures in mediobasal frontal white matter that are crucial for the generation of dreams are the basal forebrain fiber pathways that connect midbrain dopaminergic nuclei with mediobasal frontal cortex (the mesocortical-mesolimbic dopaminergic pathway). This
suggests that whatever this fiber pathway does is critical for the function of dreaming (Solms, 2000). These are precisely the fibers that were targeted by the modified prefrontal leukotomy procedure which was so popular in the 1950s.

There is evidence to suggest that modern antipsychotic medications act on this same pathway (Breggin, 1980). A review of the older psychosurgical literature reveals that cessation of dreaming was a common consequence of prefrontal leukotomy (Solms, 1997). Evidently whatever it was that prevented leukotomized patients from sustaining their psychotic symptoms also prevented them from generating dreams. I am unaware of any research into the effects of modern antipsychotic medications on dreaming. However, there is considerable evidence that dopamine agonists in general (e.g., L-dopa) stimulate excessive dreaming and that dopamine antagonists (e.g., haloperidol) suppress it (Sacks, 1985, 1990, 1991). If we review classical dream theory in the light of these findings, we have an empirical basis for linking the libidinal drive (or important manifestations thereof) with mesocortical-mesolimbic dopaminergic pathways. It is therefore not without interest that contemporary neuroscientists include these pathways in the "curiosity-interest expectancy command systems of the brain ... which instigate goal-seeking behaviors and an organism's appetitive interactions with the world" (Panksepp, 1985, p. 273). An Integration of Psychoanalysis and Neuroscience compound optical instrument, as Freud (1900) suggested in The Interpretation of Dreams. I hope also that this example shows how the method of syndrome analysis makes it
possible to identify the component parts of the brain
between which a complex mental function is distributed,
and what the elementary contribution is that each of
those parts contributes to the functional system as a
whole. This is the scientific yield of the method that we
have developed in neuropsychology over the past 60 years,
since the death of Freud. 4. Before I can end this essay,
and rest my argument for an integration of psychoanalysis
and neuroscience on the basis of this method, we must take
account of the fact that the research I have just
described studied only the manifest dream process. In
other words, it only studied directly the effects that
damage to different parts of the brain have on the
conscious experience of dreaming, and it had to infer the
underlying unconscious mechanisms from the manifest
symptoms. This is because we cannot lay bare the full
unconscious structure of a psychological syndrome by
examining a neurological patient at the bedside, and still
less by assessing him or her in a neuropsychological
laboratory. To gain more direct access to these deeper
mental strata of a patient, regardless of whether the
patient has a brain lesion, we need to get to know the
patient as a person, within an analytic relationship, in a
reliable professional setting, within which we can win
their confidence through tact and understanding, and by
analyzing their resistances, and then unhurriedly observing
the way in which the internal determinants of the symptoms
gradually unfold in the transference, and by testing the
hypotheses that occur to us in this regard in the form of
appropriate interpretations, and observing the effects that
these have on the subsequent analytic material, and so on.
In other words, we can only properly elucidate the
dynamically unconscious structure of a mental symptom by
means of the psychoanalytic method. We all know that this
is not the easiest way to study a psychological syndrome,
but we also know that it is the only true and reliable
method when it comes to those deeper aspects of mental
life that neuropsychology has left unstudied but that have
always been of central concern to us in psychoanalysis,
namely, the dynamically unconscious structure of the human
personality. In fact, the emotional resistances which
conceal the internal structure of the personality
probably explain why the neurological organization of
this, the most important aspects by far of human mental
life, have still not been systematically explored by the
method of syndrome analysis. This is the scientific
contribution that I believe psychoanalysis can make to
neuroscience, and this is the next step that I believe we
must now take.
Ironically we owe the development of a clinical procedure for analyzing these deeper mental strata to the fact that Freud abandoned neuroscientific methods of investigation when he realized that they were (at that time) unable to accommodate the dynamic nature of human mental processes. Now it seems the time has come for us to reintroduce the fruits of his labors to the neuroscientific field out of which they originally grew. In doing so—although I do not wish to underestimate the enormity of the task before us—I believe that we will be able to gradually integrate psychoanalysis and neuroscience, on a solid clinical basis, in a way that is beneficial to both fields, without ignoring any of the valuable lessons that the pioneers of psychoanalysis fought so long and hard to learn. What I am recommending, therefore, and what I believe will provide the essential cornerstone for a lasting integration of psychoanalysis and neuroscience, is a fully psychoanalytic investigation of patients with focal neurological lesions. In other words I am recommending that we chart the neurological organization of the deepest strata of the mind, using a psychoanalytic version of syndrome analysis, by studying the deep structure of the mental changes that can be discerned in neurological patients within a psychoanalytic relationship. If I had more space, I would have liked to describe the preliminary
results of a study that

my wife and colleague, Karen Kaplan-Solms and I began fourteen years ago,

using precisely these methods (Kaplan-Solms & Solms, 2000). We have so far

studied the subjective life of 35 patients with focal brain lesions by taking them

into psychoanalysis or psychoanalytic therapy. Colleagues in America, Austria, and Germany are beginning to undertake similar studies. This research is starting

to reveal the neurological organization of those deeper functional systems which only the psychoanalytic method of investigation can reveal. We report on this research in detail in our forthcoming monograph (Kaplan-Solms & Solms, 2000).

Unfortunately I only have space here to make the point that it is now possible,

using the methods that I have described, to elucidate the neurological organization of the deepest mental functions that we have traditionally studied in psychoanalysis using purely psychopathological material. I hope that I have conveyed this point convincingly, despite the fact that I have only been able to hint at how my way of approaching the problem actually works in practice, and have only been able to describe a fragment of the sort of data that it generates. Nevertheless I hope that I have at least been able to convince you of the principle that this is a worthwhile way to proceed. I will know
that I really have succeeded in doing so if some readers put into practice the
method I am recommending, and judge for themselves if it is capable of achiev
ing what I am claiming for it. An enormous scientific effort lies before us, so I

...


Creativity refers to major, original accomplishments in difficult endeavors and cannot be correlated to any specific personality attributes. Assessments of creative success involve social judgments; in most societies, activities open to women have not been highly valued. Until recently, only very exceptional women have been able to transcend the obstacles to success in fields not reserved for their sex. Whenever such impediments are removed, women have equaled the creativity of men.

In current social conditions, public success may depend on aggressive behavior of a kind many women will not engage in, often on moral grounds. Others are likely to sacrifice self-interest out of altruism, particularly in behalf of members of their family. Pregnancy and lactation often decrease a woman’s commitment to other activities, partly on a hormonal basis. Guilt about having too little time or energy for children may be expiated through self-sabotage at work, and a husband who resents a woman’s creative success will frequently sabotage her as well. In such competitive situations, women tend to be more inhibited than men, probably as a result of childhood indoctrination.

At the same time, women seem to have a greater commitment to and more
capacity for "self-creation" and the creation of humane communities.

Discussions of creativity are often muddled by a failure to define the term.

The word may be used adjectivally, to characterize a person; on the other hand,

it can refer to the successful outcome of some difficult endeavor that involves a

measure of novelty. In the first sense, an individual is said to be creative as a

result of a specific constellation of the personality; in the second, the attribution

of creativity is a social judgment, extrinsic to personal attributes and almost

entirely dependent on the shared values of a specific culture. Some commenta-

tors reserve the designation for accomplishments in the realms of high culture;

others use it for novel solutions in any kind of important enterprise--some of us

have even proposed (see Gedo, 1983, Epilogue) to acknowledge the "creativity 215 216 The Creativity of Women of everyday life," that is, finding novel solutions for the various challenges of routine existence. There is no doubt whatever about the historical fact that most societies, including those of the industrial world, have assigned high value to masculine activities and low ones to those traditionally pursued by women. Hence, for the most part, women have achieved public success only by entering fields beyond the roles their society has made generally accessible to them. In these endeavors they often encountered severe obstacles; perhaps the domain in which these could best be managed was that of religion, where there have always existed certain institutional structures reserved for women—to be sure, in the Western world, such careers could only be followed by sacrificing family life for their sake, and success generally depended on some measure of education actually available to relatively few. Despite all that, exceptional individuals
did with some regularity overcome all obstacles to produce dazzling spiritual accomplishments. Probably the most dramatic achievement of that kind was that of Joan of Arc, whose intervention was decisive in liberating her country from foreign rule, but Saint Catherine of Siena, who healed the schism in the Church by bringing the Papacy from Avignon back to Rome, accomplished just as much. Neither sainthood nor the restoration of a commonwealth can be expected to occur with any frequency, especially not in the ranks of women committed to family life. In patriarchal societies, women therefore eventually became most likely to reach public success in certain artistic endeavors, particularly in literary pursuits, because these can be carried out privately, on a seemingly nonprofessional basis. Obviously such activities were for a long time confined to the upper strata of society, but by the eighteenth century, in much of the Western world, bourgeois women could become successful authors or painters. The Enlightenment brought with it the progressive breakdown of the barriers that had deprived most women of the educational opportunities necessary to prepare to tackle difficult intellectual endeavors, and the nineteenth century witnessed the gradual integration of women into most of the domains of art and science—from Jane Austen and George Sand through Mary Cassatt and Berthe Morisot, to Florence Nightingale and Marie Curie. In our lifetime women have proved themselves to be just as suited to the activities honored by society as are their fathers and brothers. Why, then, are questions still asked about women and creativity? Is it because fewer women than men choose careers in certain prestigious fields? Because many continue to be less career oriented than success requires? Because others do not choose to battle the residual obstacles in their way but seek satisfaction in the creativity of everyday life, instead? I suspect that such statistical considerations do play a role in casting doubt on the "creativity" of women, if that is defined in terms of public success. I believe, however, that the conception of creativity as a discrete function of personality, a purely speculative notion, is

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a factor of even greater importance in raising such doubts. Now that it is no longer respectable to denigrate women for lacking a penis (or a conscience), it has become necessary to accuse them of having a lack of
that mysterious characteristic, "creativity." (In psychoanalytic terms, this idea formerly took the form of asserting that creativity is a function through which people compensate themselves for the inability to bear children. According to this notion, most women are consequently only good for producing babies.) The illegitimate transformation of the predictable outcome of social conditions into a fictive biological pre disposition—that of creativity as one psychic function—continues to produce confusion about the true potentials of women. At the same time, it is fatuous to deny that the difference between the sexes goes far beyond the reproductive system, for we now know that the very organization of the brain is sexually dimorphic—an effect produced by the action of endogenous testosterone. The plasticity of the developing central nervous system is so great, however, that various types of organization can yield essentially similar results in terms of functional capacities. In other words, there is no reason to believe that any particular outcome of the development of the brain is more advantageous for creative success than any other. (See Schore, 1994. See also Levin [1990], who reports studies from Japan that show the differential effects on brain organization of acquiring different mother tongues. These dif
ferences between the brains of Japanese-speakers and
members of other ethnic
groups are not correlated with any distinctions in the
realm of "creativity." The biological differences between
the sexes exert their effects on their re
spective achievements not because their central nervous
systems are differently
organized, but in more indirect ways. Probably the clearest
illustration of such
an effect (and the one that may well have the strongest
impact on the choices
men and women make that contribute to success in difficult
endeavors) con
cerns the correlation between levels of testosterone
production and aggressivity.
Few would deny that, as a group, males tend to be more
aggressive than fe
males—a rule common to all mammalian species. (It has long
been understood
that castration leads to docility in all domestic animals.)
In many societies
aggressivity, in tum, is often one of the essential
components of the kind of
behavior necessary to achieve success in "creative"
endeavors. Let me underscore the point, however, that the
capacity to behave aggres
sively is the result of a number of factors, including
various characteristics of
the personality, so that in individual instances
testosterone levels are not neces
sarily decisive in that regard. Similarly there are
countless ways of skinning a
cat, so that creative success does not always depend onullishness. Nonetheless
I believe that, as a group, women are much less likely to override the wishes and needs of their associates than are men, so that they are more likely to sacrifice opportunities for creative accomplishment. I can offer several examples of that kind from my psychoanalytic practice--from instances in which a girl's ambitions and self-assertion suffered inhibition because they aroused the hostility of parents or siblings, through others wherein they stimulated excessive guilt because childhood vicissitudes had convinced the person of her magical destructive power, to those in which they were ever outweighed by other considerations, such as a need to use aggression only in the service of others. (I have provided detailed case reports about all these contingencies in Gedo, 1983 and 1996a.) In my clinical experience, boys are less likely to become inhibited on the basis of such conflicting psychological pressures than are girls, and this relative imperviousness to the influence of the milieu may well be attributable to hormonal factors. (Conversely, it is also possible that the greater tendency of women for altruistic self-sacrifice may be hormonally determined.) Perhaps the most impressive example of the inhibition of aggressivity to interfere with a woman's creative success I can cite is that of a person whom I have followed for about 40 years. She was initially referred to me after a maximally serious suicide attempt that followed a bitter disappointment in a lover who turned out to be merely sexually exploitive. (It was no coincidence that my patient had been sexually abused as a child without being able to elicit a protective response from her mother.) Treatment soon brought to light her intense anger at all those who had exploited and disappointed her, rage that had been turned against herself, largely because her morality precluded any exercise of "selfishness." It took several years of psychotherapy to modify these mental dispositions so that she could tolerate being angry with others without having to punish herself. She then longed to engage in some challenging enterprise, but she was married to a man who needed a great deal of support, they had young children, and she did not feel justified about pursuing her own interests at their expense. After a hiatus the patient returned for a second course of therapy because her family life did not satisfy her; she was depressed because
she felt that she was not making full use of her abilities. She wanted professional qualifications equivalent to those of her husband—it was clear to her that her potentials were at least as promising as were his. (In my judgment, she was still underestimating herself; she seemed to me to be one of the most intelligent persons I had ever encountered.) Ultimately, however, she sacrificed an opportunity for professional training for the sake of promoting her husband’s career and the upbringing of her children who had severe developmental problems. This decision repeated one she had made in adolescence, to focus her energies on fighting to obtain an education for her younger brother, who subsequently became a respected scientist. That sacrifice forced her to attend schools where she could not prepare for any intellectual occupation. A generation later her self-restriction again had some role in ensuring that her own children could become highly successful. The second period of psychotherapy was terminated when the patient found an acceptable compromise between altruism and self-assertion: With her children properly launched in school, she returned to work in the paraprofessional occupation for which she had been trained. She did so in the context of a business enterprise started in conjunction with her husband and, in vital respects, guided by her acumen. (This entrepreneurial initiative eventually made them wealthy and provided the patient’s spouse with an adequate career until his ultimate retirement.) The patient also became active in the national organization of the practitioners of her occupation, and she was gradually gaining prestige and influence in that domain. Several years later, now past the age of 40, this woman consulted me again with a recurrence of serious depression. Her life had not changed significantly, and it was precisely this stasis that appeared to have made
her consider suicide

once again. On this occasion I recommended attempting a full-scale psycho
analysis—I was by then bolder, more experienced, and confident in the broader
therapeutic scope of psychoanalysis. The analytic effort was largely successful
in overcoming the patient’s propensity to yield to the intrusive, parasitic de
mands of her associates—initially her mother and her father—to live a symbiotic existence with them. One result of this change was freedom on the part of
the patient to push her husband to sell their business, so that they could both
"retire." This turned out to be a lengthy process (for a great deal of money was
involved, and the patient proved to be quite patient!), but when it was com
pleted, this woman was able to obtain graduate training in an esoteric discipline
that for her had always constituted a private passion—in her milieu, deemed too
"impractical" (and hence "selfish") for her to have considered it as a career. Of course, in late middle age she could no longer count on making a signifi
cant "creative" contribution in such a field (which requires a long apprentice
ship to achieve real mastery)—but her ability to pursue it at all indicated that the
creativity of everyday life that had distinguished everything she had undertaken
would, in all likelihood, not have deserted her if she had been free to invest her
efforts in an enterprise she really loved. At any rate this
dramatic history illus
trates the devastating effect on creativity of the
inhibition of appropriate aggres
siveness; in this specific case, all three of the sources
of conflict about this adap
tive requirement I listed above were operating
concurrently. Instead of spelling out other configurations
of inhibited aggressiveness more
likely to occur in women than in men, let us consider some
of the unavoidable
consequences of parenthood on creative activities. Although
these are in large
part determined by social expectations, the effects of
pregnancy (especially
multiple pregnancies), lactation, and the mother’s share of
the responsibilities
of "primary caretaker" should not be underestimated. While
they are engaged in
these absorbing endeavors, many women tend to experience a
loss of ambition
in other respects. No doubt, this is the inevitable result
of identification with a
"good enough" mother and acceptance of the age-old social
role of woman-as
nurturer. Yet, once again, we cannot discount the strong
influence of hormonal
levels that constitute the biological bedrock of the human
behaviors to safeguard 220 The Creativity of Women the
newborn-dispositions to take care of offspring lacking any
biological (as opposed to ideological) impetus in males.
In other words, although it is not an inability to bear
children that compels men into compensatory creative
endeavors, the biology of motherhood does propel many
women into devoting a considerable segment of their lives
into "creativity" only pertinent within the family.
Obviously such a commitment makes creative success in other fields considerably less likely. It is all very well to provide a "mommy track" for women unwilling to make a choice between their competing goals, but there is no way to compensate for the loss of experience and momentum attendant on such a compromise situation. In psychoanalytic practice I have never encountered a woman who failed to experience some guilt about giving equal weight to her professional ambitions and her family responsibilities, and such reactions tended to be more severe whenever private ambitions were actually given priority. Of course, in itself, a guilt reaction need not interfere with performance, but most people have a poor tolerance for chronic guilt feelings and tend to engage in acts of expiation as the followers of the British analyst, Melanie Klein put it, to make reparation. In several female patients who felt guilty toward their children (sometimes without being fully aware of this), expiation took the form of arranging to derive no pleasure or profit from the professional activities that competed with those of child care. The clearest instance of this kind I have witnessed was one in which a husband, envious of his wife's professional promise, encouraged the children to complain that they were neglected. I am not in a position to judge whether these complaints were justified; when I performed the analysis, the children were adolescents and my patient was a professional failure. One of the favorable outcomes of treatment was the analysand's ability to forgive herself for past decisions that led to unhappy results-decisions based on the obligatory repetition of certain transactions of early childhood. Subsequently this person was able to produce scientific work that earned her a considerable reputation (in a highly specialized field, to be sure). Once again a person liberated to do creative work only in middle age could not achieve what she might have done if she had been able to permit herself to be successful earlier—but the case illustrates the fact that a woman's careerism at the expense of children can produce devastating self-restrictions. I have never seen anything of this kind in the case of a man. Some of the illustrative vignettes I have already presented demonstrate that the attitude of her spouse codetermines a woman's reactions to pursuing a career. In my clinical experience, whenever a patient's husband opposed her creative ambitions, he either succeeded in wrecking the marriage or in blighting his wife's career—sometimes he achieved both. In this regard, however, I have observed no real difference on the creativity of men and women: wives can almost as easily sabotage their husbands' ambitions as men can those of their spouses.
However, I believe women may be more likely to inhibit their competitiveness when it is aroused by their husbands than are men when they are in competition with their wives—an effect that probably goes beyond any sexual difference in levels of aggressiveness. Although social mores are probably implicated in this pattern, I suspect that it is not the mores of adult life but those applied to children in the oedipal period that are responsible for this difference. At least in my clinical experience, families have been much less tolerant about the tendencies of little girls to try to outdo their fathers (which is often seen in terms of penis envy) than in those of boys to compete with their mothers (often approved as a harbinger of masculinity). In other words, persistence of the so-called negative Oedipus complex in boys may yield an acceptable character trait if it acquires a veneer of "masculine protest." In both sexes phallicity may later become equated in fantasy with "creative" endeavors; if such a conflict is revived in marriage, women seem to be more vulnerable to unconscious castration fears than are men. (This often leads to defensive hysteroid behaviors that never promote a woman's creativity either.)
As I have previously put this issue,

In [one] group of women who have needed analytic assistance
to realize their

creative potentials, the father responded to the child's
promise by feeling per

donally threatened by its implications. In the most
flagrant cases, this reac
tion resulted in a campaign of persecution -- belittlement,
ridicule, false accu
sations of hostility, and worse. In one instance, this type
of response was

motivated by the fact that the father's own creative
ambitions, generated by

... considerable talents, had never been realized. In
another, the father be
came violently jealous because his own father, who had
never paid much
attention to him, was openly captivated by his
granddaughter's sparkling in
tellect. Perhaps the most common source of these mirror
images of a negative
oedipal constellation is a pathological reaction on the
part of the child's mother,

who arouses her husband's jealous hatred by abandoning him
emotionally in
favor of a symbiotic relationship with this particular
daughter, probably cho
sen because the mother wishes to share her future promise.
A particularly
insidious form of the destructive paternal response is one
in which its hostile

nature is masked by a surface ... of flirtatiousness or
other seductive behav
ior, pushing the child away from her intellectual interests [Gedo, 1983, pp. 63--64].

If, up to this point, I have devoted this essay to various ways in which their personality traits might handicap women in achieving certain goals, I should redress the balance by giving equal emphasis to psychological characteristics that give them advantages in that regard. This is a subject too broad for adequate treatment here, but I may be able to deal with that aspect which specifically pertains to creativity. I must preface this discussion by restating my belief (see Gedo, 1996b) that work--even creative work--is neither a sacred duty nor the prerequisite of mental health Freud allegedly suggested it is. I do not mean that human beings can be well adapted without choosing certain goals to commit to a vocation--only that this vocation need not have any social utility. Elsewhere (Gedo, 1983, Epilogue) I have made this point by stating that the creativity of everyday life is good enough for a good life. Another way to put it is that selfcreation is perhaps more important than any other kind of "creative" endeavor. I believe the greatest advantage of women with regard to creativity is their greater interest in and broader capacity for self-creation. (The most mundane way to document this is the evidence of their greater willingness to avail themselves of psychoanalysis.) One way to explain this sexual difference is to recall the greater talent of women as a group for emotional self-cognition and expressiveness (witness their particular suitability as therapists!); another is to refer to the more varied distribution of specific functions in their cerebral hemispheres (as shown by the better recovery of women after cerebral injuries). If the biology of women predisposes them to preside over home and hearth, it also gives them advantages in the creation of truly human (that is, humane) communities through introspection and empathy. In my judgment (see Gedo, 1996a, chap. 2), people engage in those creative endeavors that give them...
the greatest satisfaction through the pleasure of exercising their strongest talents. It is therefore scarcely surprising that a significant proportion of women (even in a benighted age that idealizes work for its own sake) still prefers not to "work," if that option is economically feasible. I suspect that such a choice is unacceptable to most men, and not only because of social pressures: Few men are content with a life of self-creation, because relatively few are very good at it. It is true that self-creation has its own pathologies (for instance, imposture, anorexia, or polysurgical addiction), but there is nothing wrong with subscribing to the "feminine mystique" (if such a commitment is not driven by anxiety). The current fashion for physical fitness scarcely gives men comparable opportunities for success or gratification. How many achievements can surpass that of one of my former analysands who, in the course of a decade of (on and off) treatment, transformed herself from a lumpy adolescent into a woman of fashion and a noted beauty? I trust that the manner in which I have addressed the subject shows that I see no value in postulating a human capacity for "creativity"; hence I do not think that talking in terms of "creativity" in women"--or homosexuals, or Orientals, or Southern Baptists--is actually a meaningful way of formulating the issues. All human beings engage in activities that many others may look upon as creative, but the capacities and psychological dispositions that determine success (or failure) in these endeavors are infinitely heterogeneous. Men and women differ in their biology, even in the organization of their central nervous system, and they are subject to different social constraints, but none of these differences leads to any personality organization that either precludes or guarantees any particular achievement. Both men and women, however, have to live with the consequences of the choices they have previously made in life----options that may have decisive effects on what they can later accomplish. Life is more complexly orga


--(1996a), The Artist and the Emotional World. New York:
No one today needs to be told that metaphor is inextricable from psychoanalytic theory—that it makes significant appearances in the therapeutic dialogue and in psychoanalytic writing, as well as in some important psychic processes. Analysts have been writing explicitly about metaphor since at least 1930 (M. Levin), and Ella Freeman Sharpe's 1940 paper on the subject is still well-known. Though it is not clear how explicitly Freud himself saw the connection, Lacan (1957) stressed that the two modes of unconscious mental functioning that Freud (1900) called "displacement" and "condensation" correspond in fact to metonymy and metaphor. I myself have tried to show that Freud's theory of character takes for granted the existence of an unconscious metaphorizing process in the psyche, and Spence (1987) has suggested that certain parts of psychoanalytic theory are largely metaphorical in nature. Other authors (F. M. Levin, 1980; Modell, 1997)
have pointed to a relation between metaphor and affect, while still others (Fast, 1992; Smith, 1992) have speculated about how very early infantile experiences provide the psychic grounding for metaphor.

Psychoanalytic interest in metaphor has, moreover, been increasing, quasi geometrically. A search of the online Jourlit/Bookrev database (http://apsa.org/cgi-bin/jbsearch.pl, consulted July 28, 1998) turns up fifty-eight entries for the keyword "metaphor"—only six of them from the 1930s, 1940s, 1950s, and 1960s combined, but twenty-six of them from the 1990s alone. For all the current interest in the subject, however, only a minority of psychoanalytic writers on

For their helpful comments, I am indebted to Alan Cienki, Julie Elphee, Norman Holland, Kathleen O'Connor, Claiborne Rice, and Jerome Winer. I am grateful also to those who responded to abbreviated versions of this essay presented in 1998 at the Fifteenth International Conference in Literature and Psychology and in 1999 at the third Conference on Researching and Applying

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some of the interlocking metaphors that help to structure our concepts of softness and hardness, warmth and cold. The second main section examines the influence of those deeply rooted metaphors on attitudes toward gender (including gender stereotyping). Though the metaphors it deals
with have long-estab
lished psychoanalytic associations, this is not a
psychoanalytical essay as such.

It does, however, especially in the second section, touch
on matters that pertain
to psychoanalysis (for example, the role played by
linguistic structures in recon
stituting preverbal experience). In so doing it implicitly
raises a certain number
of questions concerning psychoanalytic theory. Some of
these issues, especially
those relative to unconscious mental processes, are
sketched out in the essay’s
brief concluding section. COLD IS HARD, WARM IS SOFT

Consider, to begin with, the following two quotations, the
first from a commencement speaker, the second from a psychoanalyst:

It is a cold hard world.

If for instance we designate . . . a little boy's passionate
love and wish to touch
etc. his beautiful, warm, soft inviting mother as sexual
then we have to postu
late that the youngster is having an erotic experience.

As his stress on "is" indicates, the commencement speaker
is resorting to a
cliche. So, in writing of the little boy’s "warm, soft ... mother," is the psycho
analyst. But why these cliches? Why do we typically pair
"cold" with "hard" and
"warm" with "soft"? Why, in other words, does English
include the conceptual
metaphors COLD IS HARD and WARM IS SOFT? Lakoff and
Johnson (1980) show that conceptual metaphors reflect our everyday experience. But from early child
hood on, our experience is full of things—snow, water from the right hand tap,
milk from the fridge—that are cold and soft, and of other things—radiators, the
burners on an electric stove, the hoods of cars parked in the sun—that are hot (or
warm) and hard.

The obvious explanation for the metaphors has to do with everyday physics.

If you heat matter, it gets softer; if you chill it, it gets harder. Apply enough heat,
and a solid will soften into a liquid; chill a liquid sufficiently, and it will freeze-
that is, solidify. The prototypical case is water and ice. Steam, even softer than
water, is relevant, too, of course. But the gaseous state seems somehow less
fundamental than the other two states of matter. We learn very early in life to
distinguish between liquids, which are soft, and solids, which typically are hard.
(The softer a solid is, the more it resembles a liquid.)

Relatively early on, fur

thermore, we learn the thermal relation between the two states, especially as far

as water and ice are concerned. 228 Cold Hard Worldl Warm Soft Mommy Lakoff and Johnson point out that metaphor allows us to understand and express one domain of experience “in terms of” another (1980, p. 59). Very often, as thinkers prior to Lakoff and Johnson had also noticed, we use metaphor to understand something abstract in terms of something physical. It is natural, therefore, that we
should apply the four physical terms “cold,” “warm,”
“hard,” and “soft” to more abstract domains. Because, for
example, physically soft surfaces are comfortable and hard
ones uncomfortable, we sometimes use hard and cold and
their synonyms to express comfort and discomfort in a moral
or psychological sense, as in the expressions “a hard blow”
(referring to a misfortune) or “softening the blow” or
“hard luck.” One of the nonphysical domains to
which HARD/SOFT and COLD/WARM 3 are most frequently
applied is that of character. We may speak, for example, of
a warm or cold personality, or we may call someone
soft-hearted or hard-hearted. Now, because our metaphorical
extensions of physical terms are governed by a principle
of systematicity (Lakoff and Johnson, 1980, pp. 7-9), our
metaphorical use of the four terms will include (though
often tacitly) a sense of the relations that prevail among
the physical terms. Thus if cold and hard go together in
the realm of the physical, that same relation will hold in
the realm of personality and interpersonal relations. This
principle is what permits effortless understanding of a
sentence like “He was a cold-hearted man, but his marriage
to a warm and loving woman made him less obdurate.” The
metaphorical structure of the sentence can be shown by the
following “mapping”: -SOURCE DOMAIN: the physical TARGET
DOMAIN: the interpersonal CORRESPONDENCES: The man’s
heart corresponds to a cold substance like ice. His
obduracy corresponds to the hardness of that substance.
-His wife’s affectionate personality corresponds to a
source of heat which, when applied to the cold substance,
melts or softens it. The attenuation of the man’s
stubbornness corresponds to the lessening of the hardness
of the substance when it is melted or softened by heat.
Given the principle of systematicity, it may be that to
some extent the metaphors COLD IS HARD and WARM IS SOFT
color any metaphorical reference to any of the four
qualities involved. They may do this without necessarily
becoming apparent. When a politician calls his opponent
“soft on crime” or when Margaret Thatcher warns George
Bush that now is no moment to “go wobbly,” no explicit 3 I
will use the normal slash (/) to indicate association or
collocation as in “HARD/COLD,” and the reverse slash (\)
to indicate opposition as in “HARD\SOFT.”

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reference to warmth is made. Probably, however, there is an
implicit sense that

warm people are more likely than cold ones to be soft or to
go wobbly. One interesting instance of this implicit
relationship (in the domain of moral 
quarities between coldness and hardness and warmth and softness is connected
to a metaphor identified by O’Connor (1995): SOLID IS GOOD. O’Connor shows (pp. 105-109) that although the opposite metaphor, SOLID IS BAD, can come into play when "solid" is seen as expressing inflexibility (as when we call someone "rigid" or "brittle"), much more frequently solid evokes qualities that we value.
Solid, O’Connor demonstrates, requires effort (a positive value in our work oriented society); it is unchanging; it is safe; it keeps its shape; and it is permanent. A parallel analysis for hard might place somewhat less weight on safe, and greater weight on keeps its shape (which harder solids do to a greater extent than softer ones) and on unchanging and permanent (as in "Diamonds are forever").
Given the emphasis on immutability, the resulting metaphor for hard might be HARD IS RELIABLE. HARD IS RELIABLE readily combines with the original COLD IS HARD to produce a kind of unconscious syllogism, generative of still another metaphor: COLD IS HARD. HARD IS RELIABLE. Therefore COLD IS RELIABLE.
Although this new metaphor normally remains unconscious and unexpressed, it probably impinges on such expressions as "keeping a cool head" or "keeping one’s cool"--certainly we feel that people who do keep a cool head are more
reliable than hotheads. We may well tend, even more generally, to perceive people

with colder personalities as more reliable (even if less likable in other respects)

than people with warm personalities. Now, Lakoff and Johnson (1980) and their associates frequently make the point that our unconscious conceptual metaphors

can bolster or even, perhaps, create false prejudices. COLD IS RELIABLE (along with the concomitant WARM IS UNRELIABLE) may be a case in point. Is there not a widespread, usually unspoken, perception that people from a cold climate--northern Europeans, for example--not only have colder personalities than people from warm climates--southern Europeans, say--but also are more dependable? (Relevant here is the old patronizing image of certain Mediterranean peoples as "mercurial"--i.e., shape-changing.) Presumably, biased perceptions of this sort

(which will be examined in greater detail in the next section of this article) are all the more insidious for being usually unconscious and for being so intimately connected to the fundamental ways in which we experience the world. In addition to the domain of personality and interpersonal relations, the domain of intellectual qualities also supports abstract senses of cold and hard and soft and warm. Take, for example, the Shakespearean text that supplies the title
Precise borders are crisp. Indeed, they have something sharp about them.

This is actually a further entailment of the physical fact that the borders of hard objects are firm. For with cubical objects (unless the edge has been rounded off), the firmer the edge, the sharper we perceive it to be. COLD/HARD, and WARM/SOFT, in other words, underlie images of sharpness. Consequently, precision, which follows from sharpness, goes with hardness, whereas imprecision goes with softness or diffuseness. This is why we may, for example, oppose a fuzzy distinction to a distinction that is razor-sharp, or why we may define a keen intellect as one that does not engage in foggy thinking. This last example may indicate that, when used in the domain of intellectual qualities, images of sharpness are governed by some such metaphor as THE MIND IS A CUTTING INSTRUMENT (as when someone is described as having a "Harvard-honed intellect"). Certainly intelligence can be incisive—as can remarks, which can also be pointed or blunt.

The concept of bluntness shows that in some cases it is possible to have hardness without sharpness. It is not, however, normally possible to be sharp without being hard. Thus, if successful wit is keen, its opposite, unsuccessful wit, is limp. One extremely commonplace metaphorical extension of the HARD/SOFT oppo
situation may be expressed as HARD IS DIFFICULT\SOFT IS EASY. These two metaphors

apply first of all to tasks-a hard job or a soft one—but are often extended

metonymically. If we want to say that getting something from a certain man is a

difficult task, we may call him a hard man or a tough nut to crack. If, on the

contrary, we think that getting a handout or loan from him is an easy task, we

may say that he is a soft touch. An easy life is a soft life, and an easy job may be

a cushy one ("cushy" probably coming from "cushion"). Often, of course, DIFFI

CULT IS HARD is used of mental activity, for example in the context of education,

where schools, teachers, courses, books, assignments, tests, problems, and grad

ing can all be hard. That the most frequent antonym for hard in the sense of

difficult should be easy rather than soft may suggest that that "hard" meaning

not-soft and "hard" meaning not-easy are merely homonyms, with no necessary

metaphorical relation. Philologically, however, "hard" is one word, not two. Fur

thermore, "easy" itself is at times synonymous with "soft," as in an "easy chair"

or "easy lob," just as "ease" often denotes physical relaxation—that is, making

one's muscles softer than if they were tensed—as in the military expression "at

ease." Both COLD IS HARD and WARM IS SOFT give rise, then,
through their various entailments, to whole constellations of qualities. All the terms within each constellation are logically and psychologically (but more or less unconsciously) 4

The etymology of a word should be of no account in this kind of analysis. But as a matter of interest the Latin root of "precise" means "to cut" and "vague" comes from a Latin word meaning "wander." 232 Cold Hard World\Warm Soft Mommy associated with one another. The two constellations can be represented in tabular form:

<table>
<thead>
<tr>
<th>COLD/HARD</th>
<th>WARM/SOFT</th>
</tr>
</thead>
<tbody>
<tr>
<td>solid</td>
<td>liquid or gaseous</td>
</tr>
<tr>
<td>uncomfortable</td>
<td>comfortable</td>
</tr>
<tr>
<td>sympathetic</td>
<td>sympathetic</td>
</tr>
<tr>
<td>reliable</td>
<td>ill-defined</td>
</tr>
<tr>
<td>well-defined</td>
<td>not comprehensible</td>
</tr>
<tr>
<td>comprehensible in detail</td>
<td>in detail</td>
</tr>
<tr>
<td>sharp (sometimes blunt)</td>
<td>flaccid or spongy</td>
</tr>
<tr>
<td>precise</td>
<td>imprecise easy</td>
</tr>
<tr>
<td>difficult</td>
<td></td>
</tr>
</tbody>
</table>

It may be that, to a greater or lesser extent, all conceptual metaphors plug into constellations of this type. An interesting consequence is that at certain nodal points the constellations connected with two distinct conceptual metaphors may coincide. The opposition comprehensible\not comprehensible provides an example. We have just seen it in the context of the constellations generated by COLD IS HARD and WARM IS SOFT. But, as mentioned earlier, there also exists a pair of conceptual metaphors, COMPREHENSIBLE IS LIGHT and INCOMPREHENSIBLE IS DARK. If we speak of a "sharp, lucid style," we are in fact simultaneously evoking the terms sharpness from the COLD IS HARD constellation and the term light from the metaphor COMPREHENSIBLE IS LIGHT. A similar simultaneous evocation of the same two metaphorical constellations is likely to occur when we apply words like "hazy" or "foggy" to intellectual activity. These terms partake both of the concept of fuzziness (indeterminacy of borders) from the WARM IS SOFT constellation and of the notion of darkness from INCOMPREHENSIBILITY IS DARK. Normally, practical problems of understanding do not arise from the potential contradictions involved in the coincidence of separate metaphors. Through the unconscious cognitive process called "blending," we fuse the congruent aspects of the two separate systems while filtering out the incongruent aspects (Turner, 1996, pp. 57-84, esp. 58 n.; Fauconnier, 1997, chap. 6) It is true, of course, that the meaning we actually convey by a word-"foggy," say-will depend in part on the personal
dispositions of our individual listeners or readers, because some of them will weight one set of associations more heavily than the 5 COMPREHENSIBLE IS LIGHT may, however, in its own right imply a cutting quality to light, given the physical fact that light helps us to perceive lines of demarcation.

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...other. This has, however, little practical importance. More important on a practical level is context. If I simply criticize someone's style as "hazy," the ideas of darkness and of imprecise edges may be equally important. If, however, I distinguish among clear, hazy, and opaque writing, I am probably thinking mainly of degrees of darkness. And if I point to a hazy distinction, I am more likely to be thinking of imprecise edges. Even when there is no overlapping between separate systems, the multiplicity of terms within a single constellation operates in a meaningful but often unrecognized way. A revealing case is that of the expression "the hard sciences."

In this expression, of the different senses attached to COLD/HARD, the most immediately operative is no doubt precision. (This has to do, of course, with what is said earlier about the relation between precision and the firmness of borders.) A hard science such as physics makes precise measurements—often with what are called "precision instruments"—and gives clear, stable, well-defined results. A softer discipline (psychology, say) makes less precise measurements, gives re
sults that are more vague and that may vary from one case to another (or from one observer to another). But at the same time, the other senses in the COLD/HARD constellation also operate. The "hard" sciences are considered more solid than other fields, are seen as producing more reliable results, and so on. They are even perceived as unsympathizing, because in the popular mind they are disassociated from human qualities in general, as may not be the case with "human" sciences such as psychology or sociology. Indeed, one of the overtones of the word "objective," often applied to the "hard sciences," is "like an object" and therefore unlike a human being. A connotation of difficulty also adheres to the hard sciences. High school and college students may say that physics and chemistry are hard subjects, whereas sociology, for example, will be said to be an easier one, a softer option. The apparent contradiction between "comprehensible" and "difficult" (both from the constellation COLD/HARD) is apparent only. Although it is difficult to master the hard sciences, success in mastering them gives you knowledge that is perfectly comprehensible---clear, solid, and reliable. But just because perfectly precise understanding is thought to be unachievable in other fields, those other fields
are considered as less demanding. If a kind of intellectual cachet attaches itself to the "hard" sciences, it is in part because of the connotations of all the unspoken terms in the COLD/HARD constellation. Those who work in the "hard" sciences are unafraid of intellectual difficulty. Their professional thinking is solid and objective (in that it takes no account of human factors). They produce knowledge that is reliable, well defined, and comprehensible in its details. Their minds are sharp and precise. They may look down on those who have chosen fields that by comparison are easy, whose thinking is airier (or more mercurial) and more subjective (i.e., subject to warm. (Such impressions would be particularly strong when the infant is being fed from the breast, which is itself soft and warm—and releases, as of course a bottle also does, a soft, warm fluid into the infant's mouth.) The father is seen, in contrast, as hard and cold. He has no breasts, and probably has less body fat, proportionally, than the mother, but he may have harder, more prominent muscles. Furthermore, because the father does not nurse—or, in the case of bottle-feeding, probably does not give bottles as frequently as the mother—he is likely to hold the infant physically in a rather different way from the mother,
perhaps not quite so close to his body, so that with him the child has somewhat less of a sense of warmth than it does with the mother. Such a picture is probably too simple. In fact men and women have exactly the same body temperature. It may well be that anyone, male or female, who picks up an infant and holds it tenderly against his or her body will be experienced as warm and soft. Though men cannot breast feed, they can and do give bottles. Indeed, some children have males as primary caretakers, and we have no reason to believe that in the speech of such children the association between WARM/SOFT and female is especially tenuous (although that question, along with others, does invite empirical study). In any case, much or most of the experience of being nursed or given a bottle is, at least in Western societies, already over by the time the linguistic categories mother and father have been acquired. (And if the categories mother and father have any preverbal forerunners, a good part of the experience of nursing is in the past before even these pseudocategories have been acquired.) It is in fact extremely difficult to say how many of the perceived differences between "father" and "mother" correspond to real physical experiences during infancy and how many of them are later constructions, influenced by acquired
linguistic structures, which we retroject, presumably by the process that Freud called nachtriebigkeit, onto our infantile memories. At some point, possibly very early on, we fit the opposition mother\father and its generalized equivalent female\male into the whole inferential system implied in COLD IS HARD\WARM IS SOFT. Once that is done, mother\father and female\male partake inevitably of all the entailments that the logic of the system generates-so that if “father” strikes us as cooler than “mother,” it may well be due as much to the way our language makes us think and speak about fathers and mothers as to our actual experience.

(This is not to deny that the semantic structures involved themselves reflect aspects of our collective experience, including the fact that, historically, primary caretakers have been female. ‘) Similarly, with respect to other qualities that we ‘In an empirical study of form symbolism in English-speakers, Liu and Kennedy (1993) find a high degree of correlation among mother, warm, and soft, and among father, cold, and hard. More recent research by Kennedy, Liu, Challis, and Kennedy (in preparation) reveals similar correla
tions among speakers of Danish, Japanese, and Slovenian. These results, though difficult to inter
pret, seem to point to the importance of the non-linguistic. 236 Cold Hard World\ Warm Soft Mommy ascribe to one or the other gender, the two factors—our empirical experience and the logic of the underlying metaphorical system—will interact, often without our being able to know which plays the greater role. Possibly, for example, the
perception of woman as mutable has something to do with the menstrual cycle. Arguably it originated there. If so, it has been enormously reinforced by the system of metaphorical implication this article has been analyzing. It is also possible that the perception of women as mutable arose directly from that system of metaphorical implication. Possibly, that is to say, real (or even imagined) behavior related to the menstrual cycle has merely been exploited, unconsciously, as corroborating evidence for an independently existing notion. For, whatever the reality of female behavior may be, a perception like "Some women tend to behave unpredictably at certain points in the menstrual cycle" is inevitably incorporated, more or less unconsciously, into the intellectual structures governed by the WARM/SOFT/FEMALE and COLD/HARD/MALE constellations. Something similar can be said of the ascription of a cluster of metaphorically "phallic" qualities to males. (Here I am discussing the gender stereotyping to be found in the object of psychoanalysis-the human psyche-and not gender stereotyping in psychoanalytic thinking itself. Early psychoanalysis was guilty of gender stereotyping, but neither that nor present-day psychoanalytic theories of gender are my concern here.) It is true of course that men, unlike women, possess an easily visible organ which, when erect, becomes hard; but why should that fact carry over to, say, stereotypes about male and female thinking? Probably phallic considerations-which are of greatest concern to the child relatively late in the developmental process, after it has mastered language-are simply inserted into logical and metaphorical schemas that have already developed. Given that, and given the binary logic governing the HOT\COLD and MALE\FEMALE oppositions, there ensue a number of further (and, as usual, largely unconscious) entailments concerning gender difference. One such entailment has to do with the the quality of vigor. Conventionally, vigor is perceived (or, as I have argued elsewhere, misperceived) as characteristic of hard maleness. That being so, the inverse quality of languor is attributed by binary logic to the female. Languor then connects in its turn with further characteristics from the WARM/SOFT/FEMALE constellation. One such characteristic is warmth itself, and another is acidity. (Compare the Italian expression averela fiacca, meaning to be overcome with lassitude.) Yet a third such characteristic—a basic logical entailment of the opposition between solid and liquid (though it may also be affected by early experiences of being fed)—is moistness. Moistness and warmth, having obvious associations with both erotic response and with climate, give rise to a new metaphor:
EROTIC RESPONSE IS A CLIMATIC PHENOMENON. Hence we
describe lovers as "sultry," "torrid," "hot," "frigid," and
so on. If this metaphor appears to be used more frequently
about women than about

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men, it is perhaps because both women and climate are seen
as enveloping

phenomena.

Vigor has a further entailment. It implies effort. Thus,
if vigor connects with

hardness through being male and penetrative, it also
connects with hardness by

being associated with difficult tasks. This association of
phallic vigor with diffi
cult enterprises helps to structure the notion that the
"hard" male is created for
difficulty and strenuous effort, the "soft" female for
ease and indolence. (A similar
antithesis is sometimes drawn between north and south. The
two antitheses can
be telescoped into one, as in Shakespeare’s Antony and
Cleopatra.) And only a

slight extension of the opposition between
hard/strenuous/male and soft/indo

lent/female is needed to arrive at the notorious sexual
metaphor MALE IS

ACTIVE/FEMALE IS PASSIVE.

The MALE IS ACTIVE metaphor combines with, among other
things, the opposi
tion between penetrativeness and receptivity. Because in
sexual intercourse the

male penetrates and the female receives, penetrativeness
becomes a part of the
COLD/HARD/MALE constellation, and receptivity a part of the WARM/SOFT/FEMALE constellation. That much is based on simple experience. There are entailments in volved, however, which are at some remove from the empirical. For if PENETRATIVE IS MALE and if male is active, then the obvious conclusion is PENETRATIVE IS ACTIVE. Now, in reality, as numerous discussions in the psychoanalytic literature have helped to establish (most notably, perhaps, Schafer, 1974, pp. 481-82), penetration and activity are not always the same thing. When a baby sucks at her mother's nipple, the nipple penetrates the baby's mouth, but it is hard to claim that the mother is more active than the baby (Freud, 1933, p. 115). When Freud smoked a cigar, no one thought that the cigar was the active partner in the interaction and Freud the passive one. Nevertheless, the network of metaphorical connections, which more or less unconsciously structures our thinking on this point, foists upon us an association between penetration and activity, based on both terms' belonging (one of them dubiously) to the COLD/HARD/MALE constellation. Some of the metaphorical connections behind this association follow plausibly, to be sure, from everyday experience. Hard and sharp objects, for example, do penetrate more readily than soft ones. But some of the connections
involved, like the one between vigor and maleness, are based, as I say above, on dubious psychic perceptions. Others, like the notion that maleness goes with arduous undertakings, follow from fallacious implication (the result of an equivocation between hard in the sense of not soft and hard in the sense of difficult).

Still others may be based on some combination of false perception and faulty logic.

Unconscious metaphor, then, which enables thought and communication, also enables stereotyping and the tacit dissemination of prejudice (as with the idea, mentioned in a previous section of this article, that northern peoples are more reliable than southern ones). The following chart is inevitably incomplete. It gives some indication, nevertheless, of how much gender stereotyping is fostered by the implicit entailments of rudimentary conceptual metaphors. MALE hard cool or cold dry uncomfortable unsympathizing solid dependable precise favors distinct demarcations illuminates reality (visible genitals) ultimately comprehensible sharp (or sometimes blunt) vigorous made for effort and difficulty ("hard") active penetrative (hard, sharp) conquers gravity (via erections) belongs above struggles against nature (gravity) FEMALE soft warm moist comfortable sympathetic flowing, labile, airy mutable imprecise favors fuzzy demarcations veils reality (veiled genitals) ultimately incomprehensible spongy, elastic languid made for ease ("soft," "easy") passive receptive (soft) cooperates with gravity belongs below represents nature

We do not, of course, always speak and think about sexual difference as schematically as this chart might indicate. One reason is that we are not the mere slaves of our unconscious metaphors. Another is that, in the area of sexual difference as in others, numerous and often contradictory metaphorical systems coexist. The chart

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<td>illuminates reality</td>
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<td>ultimately comprehensible</td>
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<td>vigorous made for effort and difficulty</td>
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<td></td>
<td>active penetrative (hard, sharp)</td>
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<td>belongs above struggles against nature (gravity)</td>
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<tr>
<td>FEMALE</td>
<td>soft</td>
<td>warm</td>
<td>moist</td>
<td>comfortable</td>
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<td>flowing, labile, airy mutable</td>
<td>imprecise favors fuzzy demarcations</td>
<td>veils reality (veiled genitals)</td>
<td>ultimately incomprehensible spongy, elastic languid made for ease (&quot;soft,&quot; &quot;easy&quot;)</td>
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shows, for example, that male erectility implies, by binary opposition, an association between females and the tug of gravity. Such an association probably enters into (among other things) the concept of "Mother Earth," perhaps especially into the idea of death as a return to Mother Earth. Possibly it also enters into the adjective "gravid." But often, especially when we are speaking or thinking of sexual activity, FEMALE IS A TUG TOWARD THE EARTH is overridden by SEXUAL AROUSAL (in the male and female both) IS UP. Similarly the metaphors MALE IS COLD/MALE IS HARD/HARD IS COLD, and so on, which would logically imply that the erect penis is cold, are usually overridden, in a sexual context, by PASSIONATE IS HOT. Indeed, it is possible that our choice of metaphor in describing the consistency of the erect penis corresponds to the traditional psychoanalytical distinction between the phallic and the genital. In reality an erect penis, however hard,

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is covered by human flesh, which is warm and, compared with nonanimal matter

such as metal or stone or wood, soft to the touch. This does not, however, pre

vent us from metaphorically using inorganic terms to describe the hardness of

the erect penis. "But she did not cry out," writes a novelist about a defloration,

"when she felt the burning of the iron." (Comparisons of the erect penis to cold

inorganic matter do seem uncommon, but not indications of a cool or cold atti

tude on the part of the penis's possessor.) Wilhelm Reich writes that for the

character-type he names the "phallic narcissist" the "penis is not in the service

of love but is an instrument of aggression and vengeance" (1933, p. 203). If that

is so, the erect penis would readily lend itself, in particularly "phallic" contexts,
to being described in terms of metal, rock, or wood—two substances of which aggressive weapons are most usually made. But in a "genital" context, in which the erect penis is seen as loving, other more sensually appealing metaphors (velvet, for example) would be more likely to come into play. However that may be, it is clear that a great deal of our thinking—about gender difference, about science, about human geography (and also about money, a subject that O'Connor [1995] analyzes in some detail)—is significantly influenced by our perception of the nature of matter. The stereotypes discussed in this article are not simply arbitrary, unfortunate figures of speech. As unfortunate as many of them are, they are deeply rooted or "entrenched" (Turner, 1991, p. 156) in us, arising from the very way we think and from the way we view the material world. They are, moreover, especially insidious for being unconscious, sometimes in more than one way. For they are at times unconscious in a psychoanalytic sense, in that part of the psychic material behind them (especially, perhaps, concerning gender difference) has been subject to repression. And also, probably more importantly, the linguistic mechanisms that structure that material are unconscious in a cognitive sense—that is to say, we are unaware of their
operation, as we are unaware of most of the linguistic mechanisms that operate when we speak our mother tongues. Given how deeply rooted the stereotypes are that arise from the HARD/COLD and SOFT/WARM structures, and given their unconconscious nature, extirpating or even modifying them may be an impossible task. Curiously, however, in one area change may have begun to come about of itself. For in the language of computer science, the value judgments implicit in the HARD/SOFT dichotomy appear to contradict conventional usage. In the conventional constellations, although SOFT/WARM entails certain appealing qualities such as comfort and sympathy, the qualities that we admire—objectivity, reliability, and so on—belong to cold/hard. Because female belongs to WARWSOFT 8 Culture plays a role here, of course, conceivably the major role. It would be useful to compare the English metaphorical systems studied in this article with similar systems in other languages. In other languages, for example, do the terms cold, dependable, and masculine belong to the same constellation, as they do in English? 240 Cold Hard World\Warm Soft Mommy and male to COLD/HARD, the entailment is that the female (comfortable, sympathetic, etc.) is merely appealing, whereas the male (objective, reliable, etc.) is admirable. But in computer science—so at least it seems intuitively, to me and to those I have spoken to in the field—these associations are beginning to shift, with greater value being attached to soft than to hard. Within computer science, for example, designing software would appear to carry considerably more cachet than designing hardware. And certainly I can think of no other area where the fuzziness of one’s logic would be proclaimed as a selling point. If I am right about this, then the use of metaphor in the male-dominated discipline
of computer science has, ironically, begun to revalorize qualities that some of the most deeply embedded patterns in our language classify as female. Unconscious Mental Processes: Cognitive and Psychodynamic Much psychic symbolism, including classic "Freudian" symbolism, depends on conceptual metaphors, such as FECES ARE A GIFT or FOOD IS LOVE. Even with no theoretical awareness of it, therefore, practicing analysts have always been sensitive to conceptual metaphor, which underlies many psychoanalytic interpretations. Whether a more explicit understanding of conceptual metaphor would be of any clinical utility is a moot question. But above and beyond the clinical, this discussion gives rise to a series of questions pertaining to psychoanalytic theory. Some of these questions have to do with the metaphorical extensions of early bodily experiences and their relation to psychoanalytic ideas about libidinal development. I have discussed that subject elsewhere, and do not go into it here. Another set of questions that I do not take up has to do with the neural basis of memory and the relation of language and memory to early experience. Those questions-many of them, at any rate-have been very capably addressed by Modell (1997), who specifically discusses the role of metaphor in the "retranscription" of memory. This article does, however, implicitly raise a third set of questions, having to do with the nature of unconscious cognitive processes. Though any real discussion of these questions would require at least a separate article (and though some of the issues involved have been touched on in varying ways by Gillet, 1995; Shevrin et al., 1996 and Matte-Blanco, 1998) some further notice of them is in order here. At one point in the preceding discussion I refer to the sequence COLD IS HARD, HARD IS RELIABLE, COLD IS RELIABLE as an unconscious syllogism. But can such a thing as an "unconscious syllogism" exist? Can the mind unconsciously perform valid logical operations? In point of fact, cognitive scientists agree, it can and does. "A recurrent finding," writes Fauconnier, "has been that visible language is only the tip of the iceberg of invisible meaning construction that goes on as we think and talk. This hidden, backstage cognition defines our mental ... life" (1997, pp. 1-2, italics added). Unconscious binary reasoning,

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to recall one example touched on above, takes the conceptual metaphor MALE IS

UPWARD (a consequence of male erectility) and from it
constructs the corresponding metaphor FEMALE IS DOWNWARD. The logical process involved is simple analogy: "Male is to upward, as female is to __ ", but here it operates unconsciously. A similar process operates, also unconsciously, in drawing the conclusion FEMALE IS LANGUOROUS from the initial metaphor MALE IS VIGOROUS.

And full-blown syllogistic reasoning—again unconscious—operates in the sequence PENETRATIVE IS MALE, MALE IS ACTIVE, :: PENETRATIVE IS ACTIVE.

These unconscious logical processes often produce valid results, but not always. Logically the first syllogism referred to above is a valid one (even though at least one of its premises is false), as is easily seen when it is reexpressed in standard form: Everything cold is hard, everything hard is reliable, :: every thing cold is reliable. But the second unconscious syllogism that I cite is (again, apart from the question of whether its premises are true) logically invalid. In standard form it would read: All males penetrate, all males are active, :: all that penetrates is active. It commits the classic logical fallacy of the undistributed middle. The logic of the two analogies that I refer to above is problematic in a somewhat different way. The binary logic that they contain is, it itself, probably
valid. What is dubious about them is the very appropriateness of applying bi
nary logic in those particular situations. Even granted, for example, that erectil
ity might be cause for affirming MALE IS UPWARD, there is no reason at all for
drawing any inference about FEMALE. 9

Now, most psychoanalytic thinking about unconscious mental processes has
been predicated on the opposition between primary process and secondary pro
cess thinking. But what of the mental processes I have just been outlining? In
some ways they appear to belong to the primary process. They are unconscious
(although a good argument might be made that in psychoanalytic terms they are
actually preconscious). They are partly based on infantile experience, and some
of the ideas resulting from them-FEMALE IS DOWNWARD, for instance--reflect, at
least indirectly, infantile wishes and fears. They are not subject to reality testing.

At the same time, these unconscious processes employ formal logical structures
identical to those found in conscious ratiocination, and often make perfectly
valid use of them. It is a little troublesome (though probably not impossible) to
classify processes of this nature as either primary process or secondary process.

I am not suggesting that the concept of primary and secondary process think
ing is, in any bald way, wrong. On the contrary, there is something extremely
valuable and right in the psychoanalytic idea of a
dichotomy between two types
of mental processes. Such dichotomizing stresses the
existence of important
thought processes that are unruly, wishful, and irrational,
and can produce

* Cixous makes a similar point about the whole series of
paired opposites that correspond to the

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The artist stands, as it were, in proxy for his generation: not only for the general population but even for the scientific investigators of the sociopsychological scene. -Kohut, 1977

This essay illuminates the resonance that exists between the dramatizations of America's premier playwright, Eugene O'Neill (1883-1953), and the thinking of Heinz Kohut (1913-1981), the psychoanalyst who evolved self psychology and its unique approach to understanding the forms and transformations of narcissism. Both O'Neill and Kohut stand as important figures of the twentieth century, indeed, as creative pioneers in their respective
fields.

A number of psychoanalytic models have been applied to study O'Neill's plays, as well as the conscious and unconscious links between his life and his works. This study reviews these applied psychoanalytic studies and discusses the unique elucidation provided by self psychology to an understanding of O'Neill's works. Moreover the methodology of applied self-psychological studies of literature, in general, and the plays of O'Neill, specifically, is explicated. Kohut and O'Neill During a 30-year writing career (1913-1943), O'Neill helped to convert the American theater from its nineteenth-century identity as commercial theater, Acknowledgment is made to the copyright holder for permission to reprint from Maria T. Miliora, Narcissism, the Family, and Madness: A Self-Psychological Study of Eugene O'Neill and His Plays. New York: Peter Lang Publishing, 2000. 245-246 Heinz Kohut and Eugene O'Neill "which existed between the poles of burlesque and melodrama" (Chabrowe, 1976, xiii) to a veritable "church" where religious art (that is, art whose primary purpose is the evocation of emotion) was performed in the spirit of the Greeks. O'Neill invigorated the American theater with his depictions of twentieth-century themes-personal alienation, greed and materialism, loss of religious faith, the breakdown of the family, racial tensions, addictions, and violence. His depictions gave psychological expression to the cultural currents of his time while, concurrently, dramatizing his personal, emotional experiences derived from a troubled childhood and adolescence within a dysfunctional and addicted family. Approximately two decades after O'Neill's last published play in the 1940s, Kohut began a process of differentiating his psychology of the self from the classical, Freudian metapsychology that had interlocked
drive theory with the oedipal complex. Kohut challenged the primacy of the drives and evolved a psychoanalytic model of development at whose core is the self as the superordinate structure. Kohut’s model of the mind directly addressed the suffering that he witnessed in the clinical arena and this model extended the reach of psychoanalysis. According to Kohut (1978a): Classical analysis sees man as conflict-ridden, struggling between submission to and rebellion against the pressures of civilization. Self psychology sees man in addition as a center of independent initiative, as psychological organization held together by a self whose nuclear program (determining his potential destiny) he attempts to fulfill in the course of his life [po 283]. Both men, one in literature and the other in psychoanalysis, first challenged and then deconstructed the prevailing conventions of their respective fields. Ultimately, they constructed new forms that were more expressive of the meaning of human experience as each of them had witnessed it. There is, understandably, a remarkable resonance between O'Neill’s art and Kohut’s psychology. The application of self psychology to the study of literature is consonant with Kohut (1978b) who argued in favor of “integrating . . . [the] two most important approaches to a meaningful life” (p. 440). These two approaches are, according to Kohut, science (by which he meant psychoanalysis) and art, and he contended that the two disciplines could enrich each other. Indeed, Kohut (1978b) responded to those who criticize psychoanalysts for misinterpreting literature by pointing out, “It seems to me a worthy enterprise to show, for example, how a great artist, a great writer, can raise his lonely suffering to a supraindividual level and can thus become the spokesman for the suffering of his age [po 436]. O’Neill was a writer who raised his suffering to a supra individual level to create great art. Indeed, Bogard (1972) describes O’Neill as having "used the stage as his mirror, and the sum of his work ... [as comprising] an autobiography." Indeed much of what O’Neill wrote in dramatic form expressed, both consciously and unconsciously, his own emotional experiences derived from a childhood and adolescence within a dysfunctional family.
beset with unresolved narcissistic issues, hostility, and self-destructive, addictive behaviors. In his more explicitly autobiographical plays as well as in others, O'Neill echoes the theme that it is the relational context within the biological family, as well as those within the other "families" that people create throughout their lives, which deter mine the psychological health and well-being of individuals. (See Gelb and Gelb, 1960, and Sheaffer, 1968, 1973 for excellent biographies on Eugene O'Neill.) Kohut (1977) admired O'Neill, referring to him as "the greatest playwright the New World has produced" (p. 287), and he described The Iceman Cometh and Long Day's Journey Into Night as "the greatest dramas of our age" (Kohut, 1978a, p. 324). The resonance that exists between self psychology and O'Neill's dramas derives not from the personal admiration that Kohut expressed for O'Neill, but from the fact that both men recognized and addressed the central psychological problems of twentieth-century America, albeit in different arenas. Within this cultural and temporal context, the individual's self-cohesion was assaulted by world wars, the growth of the technical-industrial complex, drastic distinctions in race and social class, and the weakening of supportive family ties. This shifting social environment contributed to familial and cultural fragmentation, and individuals struggled with a sense of
disorientation, disconnection, and self-enfeeblement. This sense of individual, familial, and societal fragmentation, which is so pervasive in O'Neill's works, renders his depictions particularly amenable to analysis by self psychology. Indeed, self-fragmentation is the leitmotif of Kohut's psychology of the self. In several of his writings, Kohut acknowledged that O'Neill had given expression to this psychological theme. For example, Kohut (1978a) identified the "broken-up, distorted, and enfeebled self of man" (p. 331), "the falling apart of the self and of the world" (1978c, p. 780) as the leading psychological problem of the time that had been recognized decades earlier by great artists such as O'Neill. In his ground-breaking book The Restoration of the Self, Kohut (1977) observed that "significant changes in the human condition" had occurred since the basic formulations of Freudian psychoanalysis had been laid down during the late nineteenth century. He noted the "anticipatory function of art" (p. 285), that is, the tendency of great artists to be ahead of their time in addressing the psychological problems of their era (see also Peck, 1935, and Wolf, 1978, both of whom express a similar idea). Kohut described the artist of yesterday as dealing with the problems of "Guilty Man-the man of the Oedipus complex... who,
strongly involved with his human environment from childhood on, is sorely tested by his wishes and desires." However, continued Kohut (1977), 248 Heinz Kohut and Eugene O'Neill (2005) the emotional problems of modern man are shifting, and the great modern artists were the first to respond in depth to man's new emotional task. Just as it is the understimulated child, the insufficiently responded-to child, ... that has now become paradigmatic for man's central problem in our Western world, so it is the crumbling, decomposing, fragmenting, enfeebled self of the child and, later, the fragile, vulnerable, empty self of the adult that the great artists of the day describe ... and that they try to heal. ... Eugene O'Neill ... dealt in his work with man's leading psychological problem—the problem of how to cure his crumbling self. And nowhere in art have I encountered a more accurately pointed description of man's yearning to achieve the restoration of his self than that contained in three terse sentences in O'Neill's play The Great God Brown ... : "Man is born broken. He lives by mending. The grace of God is glue" (pp. 286-287). Kohut asked rhetorically: "Could the essence of the pathology of modern man's self be stated more impressively?" In contradistinction to what he termed the "Guilty Man" of Freudian psychology, Kohut referred to the individual, which his self psychology addressed and attempted to heal, as "Tragic Man." Kohut (1977) wrote about this "man" and elaborated why he felt that a new psychology was needed: Classical theory cannot illuminate the essence of fractured, enfeebled, discontinuous human existence; it cannot explain the essence of the schizophrenic's fragmentation, the struggle of the patient who suffers from a narcissistic personality disorder to reassemble himself, the despair—the guiltless despair, I stress—of those who in late middle age discover that the basic patterns of their self as laid down in their nuclear ambitions and ideals have not been realized (p. 238). Kohut's "Tragic Man" and O'Neill's characters are cut from the same cloth, so to speak. A number of these characters embody narcissistic issues and the suffering and behaviors derived from narcissistic disorders. These include a propensity for self-fragmentation, loneliness, emptiness, depression and despair, addictive behaviors (see, for example, Ulman and Paul, 1989, 1990, 1992, for self-psychological studies on addictions), and violence. These manifestations of narcissistic disorder are addressed explicitly by self psychology. Early Psychoanalytic Literature on O'Neill Some of the applied studies on O'Neill that have utilized psychoanalytic models
distinct from self psychology have been compared and
discussed by Lichtenberg (1978). He explains that the
focus of psychoanalytic studies on O'Neill have changed
in accordance with the shifts that, over time, have
occurred in the field of psychoanalytic inquiry. Moreover,
Lichtenberg notes, most aptly, that mul
tiple observational systems and explanations in the
psychoanalytic study of bi
ography (as well as of literature) are inevitable. The
fact that a number of differ
ent models provide explanatory power to O'Neill's works
points to the richness
of these dramas and the psychological acuity of O'Neill's
characterizations. Nevertheless, a review of the
psychoanalytic literature on O'Neill reveals the
limits of classical theory, as Kohut had described, in
elucidating the emptiness
and suffering of his dramatic characters. For example,
Peck (1935) offered a
classical perspective on O'Neill's play, Days Without End,
as well as the play's
main character, John Loving. Loving, who, as an adolescent
lost both his par
ents, was described by Peck as a "neurotic personality"
who had transferred his
"mental disharmony," that is, conflicts over loving and
aggression, into difficul
ties in his adult love relationships. Also applying a
classical perspective, Weissman (1957) studied O'Neill's
life
and compared Desire Under the Elms and Long Day's Journey
Into Night as
unconscious and conscious autobiographies, respectively.
Weissman noted that
in Long Day's Journey Into Night, O'Neill distorted the dates of actual events in his life and omitted the fact (concerning the character of Edmund, who repre-
sents O'Neill) that he had been married and divorced, as well as the father of a son by the age of Edmund in the play. Weissman characterized Edmund (that is, O'Neill) as having had a strong identification with his mother and described Edmund's alternating "aggressive rebellions and passive submissions [to his fa-
ther in the play]" (p. 448) as indicative of O'Neill's oedipal conflict. Concerning Desire Under the Elms, the play he characterized as O'Neill's unconscious autobiography, Weissman (1957) identified its triangular dynamics as reflective of O'Neill's oedipal complex and its fantasies. Weissman linked O'Neill's unhappiness in his marriages and his tendency to idealize a loved woman to the point of desexualization with unresolved oedipal issues. These studies, although providing considerable insight into the unconscious dimension of O'Neill's experience, as well as its creative expression, focus en-
tirely on conflictual drives. They fail to describe and account for the suffering of characters on the basis of unmet developmental needs and the tendency of the characters to experience reactive narcissistic rage and to suffer self-fragmentation. As the scope of psychoanalytic thinking broadened during the last four de-
cades, analysts added ego-psychological and object-relational constructs to those
of the classical model. As a result, the analyses on O'Neill became more expansive, both in depth and in breadth. Rothenberg (1969, 1990) applied an innovative research approach to his work on O'Neill. Rothenberg studied early manuscripts of The Iceman Cometh in order to determine O'Neill's state of mind during the creative process involved in producing the work. He concluded that O'Neill, while creating the play, was preoccupied with infidelity and conflicted about his hostility toward his mother.

Rothenberg linked O'Neill's hostility toward his wife with that toward his mother. 250 Heinz Kohut and Eugene O'Neill Lichtenberg and Lichtenberg (1972) not only examined O'Neill's capacity to fall in love by considering his history, but also his plays, Mourning Becomes Electra, Days Without End, and Ah, Wilderness! These authors contended that O'Neill's personal conflicts barred his way from developing a mature stable relationship with a love object. They concluded that O'Neill was emotionally tied to his incestuous love objects, and that, although he could fan in love, he could not master an adult love relationship. Perhaps the most far-reaching of the applied, psychoanalytic studies on O'Neill during this era was offered by Hamilton (1976). Significantly, Hamilton, in reviewing O'Neill's biography, noted that O'Neill was a "replacement child" (Cain and Cain, 1964), and that he suffered severe trauma during his infancy which was exacerbated by the fact that his mother had become morphine-addicted during his early life. Hamilton concluded that preoedipal conflicts were more prominent than those of an oedipal nature regarding O'Neill's characterological structure. Hamilton (1976) studied a number of O'Neill's early and later works-including The Great God Brown, Desire Under the Elms, The Iceman Cometh, More Stately Mansions, Long Day's Journey Into Night, and A Moon for the Misbegotten—and made correlations between these plays and the author's core conflicts. Hamilton noted that the author tried, by virtue of his writings, to master his feelings of intense disappointment and oral sadistic rage and concluded that O'Neill's early trauma, problems
around separation, and unresolved dependent strivings led to his depression and somatic problems. Other authors examined Long Day's Journey Into Night, O'Neill's explicit autobiographical work, from the perspective of analyzing family dynamics. For example, Rothenberg and Shapiro (1988) analyzed the major defenses utilized by the family members in the play. They concluded that the defenses used indicated that there were insuperable barriers to effective communication among the Tyrone family. Similarly, Simon (1988) noted the destructiveness of the members of the family in the play, as well as the lack of empathic communication among them. He described the genesis of these problems as derived from profound oral deprivation and need.

Self-Psychological Studies: Selfobjects and Selfobject Milieus In addition to the tendency of O'Neill's characters to suffer self-fragmentation, a second, more implicit theme runs through O'Neill's plays, namely, the psychological dependency of the individual on the human surround. Kohut (1971) expressed this theme by virtue of what is, undeniably, the central construct of self psychology, namely, that of selfobjects. Selfobjects refer to our subjective experience of people who are important to us, for example, parents, spouses, and close friends. These people provide us with the psychological functions needed to maintain our self-cohesion, and, although the intensity of this need changes as a result of development, selfobjects are, nevertheless, considered essential during the entire lifespan. Given the different temporal context of O'Neill's work compared with that of Kohut, constructs derived from selfobject theory are implicit, rather than explicit, in O'Neill's plays. Nevertheless, in a number of the dramas, O'Neill demonstrated his understanding, intuitively derived, of the singular importance to a character's sense of self-cohesion, of what Kohut, later, referred to as the selfobject functions of mirroring, most especially, and
twinship, to a lesser extent. As depicted by O'Neill, an individual character is always seen in relation to
and embedded in some social context, either a dyadic relationship or a milieu of
other people. Moreover, it is the quality of these relationships that affects the
mood and behavior of his characters, as well as their cohesiveness. The self-psychological studies on O'Neill that have emerged during the last 10 years have utilized conceptualizations around selfobjects and, hence, have deepened the level of understanding of the dynamics of the characters in his plays. For example, Lichtenberg (1989) focused attention on the adolescence of O'Neill, as well as on his adolescent character, DionAnthony, in The Great God Brown. Lichtenberg succeeds in presenting a highly empathic rendering of the sensitivity of Dion and the failings of his parents as regards attending to his narcissistic needs. Lachmann and Lachmann (1992) contributed a study of Long Day's Journey Into Night. This self-psychological study is particularly significant when compared with the analyses of the same play described earlier. These authors utilized conceptualizations framed around the selfobject needs of the characters to understand the Tyrone family's progressive disintegration in the play. They observe that the idealization and mirroring selfobject needs of family members are not met and that, within these familial interactions,
narcissistic rage is evoked.

The rage is directed toward others, as well as leading to the self-destruction of

the characters. These authors draw an empathic picture of the morphine-addicted

mother, noting that her sense of emptiness and depletion left her with a propensity for self-fragmentation. Significantly, Lachmann and Lachmann take note of

the family's addictive tendencies, and they describe these as "desperate efforts

to restore an archaic sense of bliss through drugs and alcohol, grandiose fantasies, and defensive denials" (p. 235). Another example of an applied study that utilized self-psychological constructs is that of A Touch a/the Poet by Miliora (1994). In this play it is evident

that the mood of the main character, Con Melody, varies according to the affirmation (or mirroring of his grandiosity) that he receives from his wife, daughter, and friends. When his grandiosity is not affirmed, Melody feels narcissistically

injured and reacts with an outpouring of narcissistic rage. Although this play was written some three decades before Kohut elaborated his theory of self psychology, Miliora (1994) notes how O'Neill's characterization of Melody illustrates various phenomena associated with archaic narcissism. Indeed, Miliora describes the character as a "picture-perfect presentation of a narcissistic personality disorder" (p. 97). As described by O'Neill, Melody is arrogant, haughty, grandiose, and disdainful toward people he considers inferior to him. Melody, who is an alcoholic, uses both alcohol and an actual mirror to attempt to heighten his mood. His reflection in the mirror is utilized by the character to affirm his grandiose fantasy of himself. Melody's behavior suggests that he
suffered a lack of empathy on the part of caretakers functioning as selfobjects, and especially as regards mirroring, during his development. By virtue of Kohut’s theory of selfobjects and O’Neill’s depictions of his characters in relation to and as affected by their selfobject or social milieu, both Kohut and O’Neill emphasized that individuals are embedded within a human surround, a milieu of other humans upon whom they depend for their psychological survival. Moreover, it is this milieu, how it functions or fails to function, and how an individual perceives himself or herself in relation to it that, in large measure, determines an individual’s sense of self-cohesion. (See Wolf, 1980, 1988 for elaboration on the importance of feeling embedded in a supportive social matrix.) In many of O’Neill’s plays, this milieu is a biological family, but, in others, it is the “families”—school, work, social, professional—that people create throughout life and within which one derives a sense of belonging and creates a sense of self. In The Iceman Cometh, for example, this milieu or family is comprised by the regulars of Harry Hope’s saloon. As becomes evident in a study of O’Neill’s plays, each of these milieus both affect and are affected by the psychological health of the members of the “family.” O’Neill’s dramatizations illustrate that having a sense of home, family, and belonging is essential to psychological well-being. Indeed, his depictions show that when this sense is lacking in one’s experience, one can plunge into states of severe fragmentation, violence, and madness. For example, in The Hairy Ape and The Emperor Jones, the main characters literally fragment to psychotic or near-psychotic states when they lose their sense of home, their families upon which they depended for maintaining their sense of self (see Miliora, 1996, 1997a for studies of these two plays). Specifically, the character of Yank in The Hairy Ape, a man with a fragile sense of self, fragments when he suffers a narcissistic injury. Moreover, he suffers a painful sense of dehumanization when his “home” or mirroring selfobject milieu, comprised of his fellow stokers who work with him in a ship’s stokehole, is disturbed by a rich, young woman who insults Yank by calling him an ape. Yet another example of a self-psychological study of an O’Neillian play, which illustrates the importance of a mirroring selfobject milieu to sustain a character’s sense of self, is that of Hughie by Miliora (1997b). This analysis uncovered
what is implicit in O'Neill's depiction, namely, the narcissistic aspects of compulsive gambling. The study illustrates that a shared gambling fantasy enables the play's two characters to experience a sense of camaraderie, humanness, and the illusion of kinship (or twinship).

In addition to the examples cited earlier, applied, self-psychological studies of O'Neill reveal the ubiquitous nature of narcissism--expressed, for example, in the form of grandiosity, selfishness, greed, envy-and that archaic narcissistic states affect the functioning of both individuals and families, as well as one's sense of home and belonging. In Desire Under the Elms, for example, the elder Cabot is so selfish and greedy that he seeks to deny his sons their rightful inheritance. The sons, in turn, hate their father, and the youngest, Eben, who is caught in the grip of an oedipal complex, enters into a sexual relationship with his father's new, young wife in retaliation for the abuse heaped on him by his father. Among the Cabots, there is no sense of home or selfobject milieu, only a greedy desire for possession of property and people. In both The Great God Brown and Beyond the Horizon, one can observe that the effect of not having a supportive selfobject milieu leads to depression, alcoholism, and the untimely death of the
character, Dion Anthony, in the former case, and complete fragmentation of the family, in the latter (see MiHora, 2000, for studies of these plays). Methodology of Applied Self-Psychological Studies of Literature

A literary work can be analyzed on at least two levels. First, each piece of fiction can be considered as being a discrete story about particular people and their interactions. This approach, termed "endopoietic" research (Eissler, 1971, p. 6; see also, Simon, 1988), limits analysis to the play taken as a whole and eschews making connections with external elements. The second level of analysis, termed "exopoietic" research (Eissler, 1971), involves making connections between the drama with elements outside of the work. These elements not only include O'Neill's life, but also, more importantly, his subjective experience of important life events. In this context, the plays are analyzed as expressions of O'Neill's conscious and unconscious mind, in a manner similar to the exploration of both the manifest and latent content of dreams. Moreover, the plays can be studied with an explicit aim of finding expressions of the characters' recurrent, narcissistic fantasies. Some of these "archaic narcissistic fantasies" (see Ulman and Brothers, 1988, p. 15, for a discussion of the nature and function of similar fantasies) are linked to
O’Neill’s subjective experience. For example, in The Iceman Cometh, the alcoholic pipedreams of the hopeless characters of Harry’s saloon can be conceptualized as expressions of their grandiose fantasies of being successful and valued in the world. Other characters who are organized around archaic fantasies are Con Melody, the 254 Heinz Kohut and Eugene O’Neill pecunious saloon keeper in A Touch of the Poet, who imagines himself as a “grand gentleman” (Miliora, 1994) and Erie Smith in Hughie (Miliora, 1997b), a small fry gambler who fancies himself as a “winner among winners.” The first level—the endopoietic analysis—considers the group of characters, often a family, as revealing their identity, their history, and modes of interaction and behavior in the course of the action of the play. Using what is termed in self psychology, “the empathic vantage point,” this pursuit of empathic understanding is undertaken by applying what Kohut (1971) termed “vicarious introspection” (p. 219, n. 8). This “empathic-introspective observational stance” (Kohut, 1977, p. 309) is, according to Kohut (1971), “defined by the position of the observer who occupies an imaginary point inside the psychic organization of the individual with whose introspection he empathically identifies” (p. 219, n. 8). What this stance entails is an immersion in the subjective experience of the principal character(s) and viewing the unfolding drama from that perspective. According to this approach, one listens to the dialogue as if the characters were people relating a story about their lives, their feelings, and their fantasies, much as an analyst listens to patients. One “hears” how these characters relate to one another and the presence or absence of emotional content underlying the dialogic exchanges. From this empathic perspective, one comes to appreciate the actual subjective meaning of the exchange. This process extends beyond discerning motivation by reaching for the unconscious message that underlies the dialogue. In the main, O’Neill’s characterizations are well-rounded literary personages replete with character traits, feelings, motives, and fantasies. Indeed, O’Neill presents the clearly delineated psychic reality of his characters, not just their actions and behaviors. Moreover, the temporal and physical settings in the plays—which include the use of music and rhythmic sounds (see, for example, O’Neill’s The Emperor
Jones)--are meant to convey mood and evoke feelings. (See Kohut, 1957, concerning the psychological functions of music.) O'Neill's intuitive, psychological understanding of his characters and his adroit use of evocative words and settings enable the reader to empathically understand the characters. How does one analyze what is termed the "narcissistic health" of fictional characters? Berman (1990) has argued that fictional characters have much in common with real people, particularly as regards narcissistic issues. (See Baudry, 1990, for an elaboration of the similarities and differences between fictional characters and real people.) Berman has shown how characters' behavior can be used to evaluate their narcissistic health. From the perspective of self psychology, there are several pointers in a dramatic text that can be used in this regard. These include the characters' behavioral and emotional manifestations as regards empathic capacity, narcissistic rage, mood swings, chemical dependency, and violence. In addition, boundary confusion between characters, as well as the nature of their narcissistic fantasies, which are inferred rather than described.

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directly as such, are suggestive of the characters' level of development and nar

cissistic health. When the dialogue between characters is examined via empathic immersion and introspection, empathic failures can be perceived by discerning the subjec
tive experience of the recipient of the communication. When one character con
sistently fails to respond empathically to another, this suggests that that person is unable to hear the other's communication in an empathic manner. A character's inability to communicate empathically suggests psychological deficits in the narcissistic sphere of the personality. A prime example of such a character is

Mary (depicting O'Neill's mother) in Long Day's Journey
Into Night. Applying the constructs of self psychology, such deficits inform the analyst, as literary critic, that the character’s sense of self is organized developmentally around a narcissistic sense of reality. Moreover, in evaluating an exchange between characters, how the other person reacts to the empathic failure is significant. Is there narcissistic rage, revenge, disappointment, emotional withdrawal?

These emotional reactions are suggestive of the character's propensity for narcissistic injury and, possibly, for violence (Kohut, 1972). An example of a character who reacts with these narcissistic responses and expresses his rage by cold bloodedly planning a murder in revenge for his sense of narcissistic injury is Arthur Baldwin in Recklessness. In general, the characters' emotional responses to each other provide information about the nature and quality of the interaction between them, as well as their individual emotional health. Childlike and unrealistic narcissistic fantasies, narcissistic rage, substance abuse and addictions, abrupt changes in mood, and violent behavior point to a character's lacking sound narcissistic health. At least some of these pointers occur in almost all of O'Neill’s plays. Similarly the level of psychological health or dysfunction of the "families" in the plays can be evaluated on the basis of the individual characters' emotional and behavioral
responses toward one another. At the second level of
literary analysis, that is, the exopoietic approach, the
empathic-introspective observational stance is applied in
gaining an understand
ing of how Ò'Neill's conscious and unconscious experience
influenced his dra
matizations. Unquestionably autobiographical in his plays,
Ó'Neill's characters
often expressed in some form his emotional experience of
his mother, father,
brother, lovers, and wives (see Bogard, 1972 and Manheim,
1982). Accordingly, in undertaking an analysis of
Ó'Neill's works, it is assumed that
his subjective experience, much of which was organized
around the traumatic
events of his childhood and adolescence, found expression
in his dramas. This
subjective experience includes narcissistic fantasies and
accompanying moods.

The methodology that is used in this context is an
imaginative reconstruction of
Ó'Neill's subjective experience (that is, fantasies and
feelings) by a "mix of
empathic feel and intuitively used knowledge" (Lichtenberg,
1978). 256 Heinz Kohut and Eugene Ò'Neill The
recurrent, emotional themes in Ó'Neill's plays are
suggestive of his inner life. Examples of such themes are
feeling betrayed (as he did as regards his mother) and the
loss of self-cohesiveness that derives from an absence of
mirroring or affirmation. The importance to Ó'Neill of the
theme of feeling betrayed is indicated by its centrality in
the experience of characters in a number of his plays,
including The First Man, Ah, Wilderness!, Beyond the
Horizon, Desire Under the Elms, Dynamo, Strange Interlude,
and Mourning Becomes Electra . Similarly, the importance
of mirroring was thematic in Anna Christie, Beyond the
Horizon, The Emperor Jones, The Hairy Ape, All God's
Chillun Got Wings, The Great God Brown, A Touch of the
Poet, The Iceman Cometh, Hughie, and A Moon for the Misbegotten. Following the elaboration of technique initially explicated by Wolf and Wolf (1986) in their study of a literary text, immersion into O'Neill’s characterizations and depictions evokes inferential perceptions similar to those that arise in working with patients who are suffering from narcissistic disorders. Accordingly, the constructs of self psychology are particularly useful in analyzing O'Neill’s plays. Indeed, in many cases the characterizations and dynamics in the plays illustrate the theoretical constructs of self psychology. Nevertheless, as Wolf and Wolf have stated, this does not prove that the theory is correct, but only that it is a useful model for enriching the plays in ways that are unique to self psychology. The application of the constructs of self psychology enables the illumination of the interrelated thematic threads of narcissism, the family, and madness that are embedded in the O'Neill canon. Self psychology enhances O'Neill’s works by virtue of its conceptualizations of the developmental model of narcissism, the constructs around selfobjects, and its elaboration of the need for an empathic selfobject milieu (or sense of home and family) in order to maintain selfcohesion. The application of self-psychological theory to O'Neill’s characters and their interactions illustrates how narcissistic issues impact on families and those social milieus within which individuals live and which provide people with a sense of home and belonging, indeed, a sense of self. Furthermore, self psychology explicitly addresses trauma (see Ulman and Brothers, 1988) and addictions, both of which affected O'Neill during his development. His exposure to trauma, which derived from his early experiences within an addicted family, affected his subjective experience and, ultimately, found expression in a number of his plays. Conclusion Given the resonance between the creative, artistic expression of O'Neill and the scientific one of Kohut, an applied psychoanalytic study, which brings together O'Neill’s dramas and Kohut’s theory on narcissism, enriches both selfpsychology and the field of literary criticism. Indeed, the wide applicability of the constructs of self psychology to O'Neill’s dramas is an illustration of the important relationship that exists between art and science which was alluded to by Kohut.
(1970b): the emotional language of art expresses truths about the human condition to which, later, psychoanalysis provides scientific language and understanding. In addition, the integration of literature and psychology reaches toward a synthesis of the two fields.

In depicting characters struggling within particular cultural milieus, O'Neill provides self psychology with an opportunity to understand greed, envy, and murderous rage in the context of a highly individualized and materialistic culture. Indeed, O'Neill's work serves as a template with which to understand and evaluate that which is most distinctive as well as most troubling in modern America. He recorded in a powerful way the plight of men and women, as well as himself, struggling with what Kohut (1985) termed the "central anxieties of our times" (p. 169). These central anxieties, which include most especially a sense of fragmentation, contribute in large measure to the alienation, rampant violence, and self-destruction in our culture. Unfortunately these anxieties are no less true today than when O'Neill captured them in dramatic form more than


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