

# The mind beyond our immediate awareness: Freudian, Jungian, and cognitive models of the unconscious

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*Abstract:* Several branches of cognitive science now focus on the nature of the unconscious. This paper explores some of the findings and models from this research. By introducing formulations based on non-clinical data, the cognitive scientists—in neural linguistics, computational modelling, and neuroscience—may depart from the older psychoanalytic formulations. An understanding of unconscious neural processes is nevertheless emerging showing how synapses are modified by experience and how learning, conscious and unconscious, is due to this important aspect of brain plasticity. Freud and Jung’s formulations about the unconscious psyche, representing the main tenets of depth psychology, are also based on a conception of the mind as extending beyond immediate awareness. However, their models are more hypothetical in that their data, almost exclusively, come from treatments of psychotherapy patients and their verbal accounts. So how do these two conceptions of the unconscious match, where do they differ? And how does the neural understanding in the present research support theories and practices of analytic treatments?

*Key words:* cognitive science, computational modelling, depth psychology, learning, metaphor, narratives, neural linguistics, neural integration, synaptic plasticity, unconscious.

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## Introduction

### *The unconscious revisited*

Explanations of the unconscious dominated a great deal of early psychoanalysis. In the attempts to validate them, theoretical formulations about treatments were often tied to concepts from the natural sciences and biology. When these attempts failed, attention seems to have turned to other areas: Freudians focused on the ego and Jungians on archetypal images. In both instances, however, the assumption remained that the nature of the unconscious had been well established, each school believing they had the correct answers. No further explorations seemed necessary.

Cognitive science, in branches such as neuroscience, neural linguistics, neural modelling, and cognitive psychology, has again focused the attention on the nature of the unconscious. However, by introducing models which are based on non-clinical data, cognitive science has also departed from the older psychoanalytic formulations and forged ahead into new territories involving neural processes. As clinicians, we have had to admit that critical questions about what is available to immediate observation and what occurs, unconsciously or non-consciously, could never fully be answered by the pioneers in our field. Only the precise study of how the human brain processes experience will make the nature of the unconscious fully understood (Tallis 2002). If we are going to get beyond our cherished ideas, we need to familiarize ourselves with the new research and its models and find ways to translate its findings into a meaningful understanding of clinical realities.

### From philosophy to medicine

Before exploring these models in detail, a review of the discoveries and controversies in early psychoanalysis is necessary. As the historian Henri Ellenberger (1972) documents in his book *The Discovery of the Unconscious*, the idea that the activities of the human mind go far beyond what our immediate consciousness can grasp was proposed by many thinkers around the middle of the nineteenth century. Terms such as *the unconscious*, *the unconscious mind*, and *unconscious thinking* were introduced in various contexts.

As purely philosophical ideas there were no direct ways of putting the revolutionary concept into use or to test its implications in controlled studies. Cognitive science did not exist and the little psychological research that was done was still the domain of psychiatry, also a fairly new discipline. So the first people to test these ideas were physicians concerned with a kind of suffering that seems to have had no obvious and discernable physical origin, patients, primarily women, who languished in sanatoria unable to live a meaningful life and tortured by the most horrendous memories.

Research was not the foremost concern of these physicians. They were hoping to find a cure for hysteria, the name given to the illness. Mapping out the range and characteristics of the unconscious was only of secondary interest and a byproduct. So when Sigmund Freud (1895/1977) proposed that the roots of hysteria were in unbearable memories of childhood sexual abuse, it caused a storm of social indignation but did little to alter the understanding of the mind. As Judith Herman (1992) points out in her book *Trauma and Recovery*, the violence against women and children first had to be acknowledged as a political issue. Victorian society was certainly not ready to do so and it has taken a great deal of data collection to establish the extent of this abuse and the stress caused by extreme environmental forces. That the ensuing trauma also has an impact on the brain is something we are just beginning to grasp (Bremner 2002).

But clear inroads into the nature of the unconscious mind did occur. When Freud's initial understanding of childhood sexual seduction was expanded into a general theory of human motivation, a psychological exploration of the unconscious had begun. Sexual drives, manifesting in infantile fantasies, usually unconscious to the person, became the foundation for what he called 'the psycho-sexual theory' (Freud 1915/1954).

## Freud and Jung

### *The initial formulations*

Notions of the mind having many unconscious aspects were pivotal to both Freud and Jung, the two most influential pioneers in the development of psychological treatments based on depth psychology. And although the definitions vary considerably, their views of the unconscious have had the most lasting impact. Other important contributions no doubt occurred, but essentially they were modifications and remained part of a psychoanalytic and depth psychological perspective.

As Campbell Perry and Jean-Roch Laurence (1984) point out in the book *The Unconscious Reconsidered*—a book which in many ways was the beginning of a renewed interest in the unconscious among cognitive researchers—Freud's theoretical formulations about the unconscious remained fairly unchanged. The introduction of the psycho-sexual theory mainly meant that an earlier model of the unconscious became a theory of human motivation rather than particular psychopathologies.

Freud's deduction, that perceptions of the parental relationships are tied to the sexual drive in what he called *the Oedipus complex*, made it possible to view these unconscious ideations as universal (Rudnytsky 2002). It also broadened the understanding of what happens in treatments. The transference relationship to the doctor could be viewed as a repetition of these Oedipal conflicts. How to produce insight into repressed infantile wishes thus became the cornerstone of Freud's clinical theory (Freud 1914/1954).

Frank Sulloway (1979), in his book *Freud: Biologist of the Mind*, has shown us that Freud's ideas about the unconscious were in fact formulated in an early attempt to find a neurological explanation of psychology. Eager to secure a reputation in the academic community as a researcher and well before a circle of psychoanalysts was established, Freud undertook an ambitious task he called *Project for a Scientific Psychology* (1895/1977). Soon abandoned and unknown until discovered among his letters to Wilhelm Fliess, *The Project* (published in *toto* first in 1977) contains most of Freud's conceptualization of the unconscious. It also shows him grappling with several problems his early practice had raised: How do drives, especially sexuality, enter into a person's awareness? Why is there a need for repression? How accurate are repressed memories?

Relying on the mechanistic laws which his previous laboratory training had taught him, he understood the human mind to be besieged by stress, from the demands of outer reality as well as from the urges of internal drives. To manage these conflicting forces, the exogenous excitations emanating from the outside and the endogenous ones from inside, Freud assumed that a compromise had to occur (Fancher 1973).

Since very little was known about basic brain functions, Freud had to speculate about how the brain's neurons function (Reiser 1990). For instance, he assumed that neural locations hold specific ideas, memories, or perceptions and that mental activity is the result of electrochemical energy moving throughout the neural network. He also postulated that the energy for these activities, which he called 'Q', came from outside the brain itself. The neurons were only capable of receiving, holding, and transmitting excitation from elsewhere, what Freud called *cathexis* (Freud 1895/1977).

Many of the ideas from *The Project* are restated in Freud's first major work, *The Interpretation of Dreams* (1900/1999), but in a psychological rather than neurophysiological framework. Mental processes are now divided into three states, conscious, preconscious and unconscious. He writes:

We described the relations of the two systems to each other and to consciousness by saying that the *Precon.*-system stood like a partition-screen between the *Uncon.*-system and consciousness. The *Precon.*-system did not only block access to consciousness, we said, it also governed access to voluntary movement and directed the transmission of a mobile energy-charge, a part of which is familiar to us in the form of attention.

(Freud 1900/1999, p. 407)

It is clear from this schema that he saw the unconscious as primarily the seat of drives. Before these urges could enter consciousness, however, some type of filtering was necessary and the notion of an agency of censorship, defence, or repression remains central in Freud's formulations about the interaction between the conscious and the unconscious.

In its initial form, this agency was defined as the preconscious serving as a buffer zone and the seat of censorship over the dream-wish. The censor also controlled all other impulses and 'lets nothing pass without exercising its rights, and forcing modifications that are pleasing to itself upon the candidate for admission to consciousness' (p. 224).

To Freud, here was the answer to an important clinical problem: his patients' reluctance to overcome resistance to treatment and to become well. As he became more and more concerned with what worked therapeutically, his earlier assumptions remained: drives had to be channelled or modified before being allowed into consciousness. His neurological project may have been incomplete, but he now felt certain that the effects of unconscious processes were explained, both when it comes to the development of psychopathology and as a general psychology.

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*The unconscious and religion*

A desire to reconcile religion and science was perhaps the strongest impetus for Jung's explorations of the unconscious. As Murray Stein (1985) demonstrates, this desire had a personal angle, in that Jung wished to find ways of restoring a faith his father, a protestant preacher, felt he had lost. In his late memories, *Memories, Dreams, Reflections* (1962), Jung discusses his concern about the interface between religion and science by comparing the term 'the unconscious' with ideas of powers and gods which anthropologists had discovered to have been with us for a long time. He writes:

We know that something unknown, alien, does come our way, just as we know that we do not ourselves *make* a dream or an inspiration, but that it somehow arises of its own accord. What does happen to us in this manner can be said to emanate from man, from a daimon, a god, or the unconscious. The first three terms have the great merit of including and evoking the emotional quality of numinosity, whereas the latter—the unconscious—is banal and therefore closer to reality. This latter concept includes the empirical realm – that is, the commonplace reality we know so well.

(Jung 1962, p. 336)

Relatively soon after the break with Freud, Jung seems to have concluded that scientifically very little was known about the unconscious. In his 1935 Tavistock lectures, for instance, he observes that the unconscious had to be deduced introspectively and proposed hypothetically. 'Consciousness is like a surface or a skin upon a vast unconscious area of unknown extent', he suggests, concluding that as in the natural sciences, 'we need a laboratory with very complicated apparatus in order to establish a picture of that world apart from our senses and apart from our psyche [and we need]... very much the same with our unconscious—we ought to have a laboratory in which we could establish by objective methods how things really are when in an unconscious condition' (Jung 1935/1976, para. 12).

This did not stop him for speculating about the nature of the unconscious, in fact, such speculations continued to be an important part of Jung's life even after he had retired from active analytic practice (Hannah 1975).

In his initial formulations, the unconscious consists of two layers, one personal and one collective, a schema not dissimilar from Freud's. Repressed memories, he assumed, belong to the personal unconscious in that they were acquired, while what Freud regarded as the drive portion, he broadened into being a collective layer of archetypal images and energies (Jung 1928/1966).

However, in contrast to Freud, Jung continued to subscribe to an understanding of psychopathology that the French psychiatrist Pierre Janet had introduced which emphasized the dissociability of the psyche (Jung 1961/1976). This meant that some of Freud's notions, like dream censor and primary process could be abandoned and mental imagery approached without a fixed set of assumptions.

### *Psychiatric research and complexes*

In his ideas about the personal unconscious, Jung relied on experiences in his early career as a psychiatric researcher at the Burghölzli clinic in Zürich. Here he had developed ways of testing emotionally charged reactions which tend to interrupt normally functioning consciousness. When a test subject was confronted with the task of responding to a list of 50 words, his or her attention at some point became disturbed and the Burghölzli team under Jung's leadership found the resulting psychic complexes to consist of repressed and affective memory data, a theory that agreed more with the dissociation model than Freud's theory of conflicting drives and repression (Jung 1934/1969).

Observations from his work with psychotic patients at the hospital also confirmed to Jung a collective layer of the unconscious. In exploring the patients' delusional ideas, he attempted to understand them by comparing them to myths. After leaving his hospital position and his break with Freud, he explored his own dreams and fantasies for further confirmation of this hypothetical other layer of the unconscious (Jung 1962).

The conception of a two-tiered unconscious made Jung focus on broad collective elements he called *archetypes*, elements he believed to have a regulatory function beyond the sexual drive. In fact, he now saw the unconscious, especially in dreams, as having a religious and prospective function, thus being the seat of often untapped knowledge (Jung 1950/1967). Continuing this line of inquiry in his later writings, led him to speculate about a unified reality, in which archetypes also order external events. He thus posited that there was what he called a *psychoid* layer of the unconscious (Jung 1947/1969). At the same time, he seems to have vacillated about the possible innateness of the archetypes (Frey-Rohn 1969/1974).

In spite of his expressed scepticism, in his approach to patients, Jung seemed to have treated the unconscious as something empirically established. At the centre of this certainty was a conviction that archetypal images were the principal structural elements of the unconscious and that, in their most pure form, they expressed themselves in myths and other collective narratives. Drawing parallels between such images and his patients' dreams and fantasies became Jung's major therapeutic technique.

## Depth psychology

### *Philosophical and scientific background*

The speculations by both Freud and Jung left the specific synaptic and neural manifestations of unconscious processes to be inferred. Instead they utilized a conceptual framework that suited their particular purpose of generalizing from observations with their psychotherapy patients. Since very little was known about what happens in the brain—healthy or diseased—this was the

avenue available at the time. The unconscious had to be viewed as part of a larger totality, the psyche, with common roots in all humans.

This abstraction had a long history in Europe. Dating back to the Greek philosophers, emotions and mental forces were thought to be tied to the entire human organism. The human psyche had to have a hidden seat in the body, in *the soma*, possibly in the area of the liver or the heart, organs which carried a great deal of mystery for the early philosophers.

This holistic view was challenged by the thinkers of the Renaissance, in particular René Descartes. He argued that the natural world and bodily reality were ruled by different laws than the mind, laws that were expressed in the natural sciences and in mathematics: gravity, cause and effect among them. The mind, however, could only be approached by a set of universal truths, through what religious doctrines taught us (Popkin 1999). This Cartesian dualism, what the English philosopher Gilbert Ryle (1949) calls treating the human mind as ‘the ghost in the machine’, has dominated Western thinking up till our time<sup>1</sup>. And although the natural sciences were freed from religious shackles by assuming that different laws applied for the body than for the mind, the Cartesian division also created a gap between branches of human knowledge, a gap which has been very difficult to bridge.

The psychoanalytic notion of unconscious aspects of the mind is first and foremost such a bridge concept. However, without basic data about the brain, there has been a constant danger of falling back on dualistic thinking and of treating the mind as separate from the body by relying on abstractions rather than known data.

### *Drives and brain structure*

Freud attempted to avoid this problem by insisting that drives and neurobiology were the foundation for the unconscious. Jung, in speculating about unconscious archetypes uniting drives and spirit, matter and psyche, reached for solutions similar to those of the biologist Konrad Lorenz (1959) whose studies tied many animal behaviours to genetic predispositions. Although there are differences between the two theories, Jung’s archetypal theory and Lorenz’ ethology, as Anthony Stevens (1982) shows us, both place a great deal of emphasis on broadly innate patterns of behaviour, Jung in humans, Lorenz in animals.

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<sup>1</sup> Damasio (1994), of the Department of Neurology at the University of Iowa, argues that dualism is an error. When considering neurobiology, ‘soul and spirit, with all their dignity and human scale, are now complex and unique states of an organism’ (p. 252). To varying degrees, most researchers in cognitive science, neuroscience, and linguistics seem to agree—Damasio (1999), LeDoux (2002), and Pinker (2002) to name a few—and a neurobiological reason is often emphasized. However, Solms and Turnbull (2002) find that there are still some unanswered questions as to how the experience, such as a pain signal, ‘started as something physical but somehow ended up as something mental’ (p. 50).

The depth psychological arguments advanced by Freud and Jung have over the years met with much biased opposition but also some justified criticism. Hypothetical in nature, their formulations rely on supportive models from the natural sciences of their time, models that are not tied to specific data about the human brain (Gazzaniga 1998). Simplistic formulas, like the unconscious being an *id*, driven and uncivilized, have today left psychoanalysis in a precarious predicament. Claims to a scientific foundation are contradicted by the fact that its theories must be viewed more as a series of poetic metaphors than an actual understanding of the unconscious based on research data.

Freud's structural theory, for instance, although of heuristic value clinically, conflicts with what we now know about the general functioning of the brain. Although there are areas of the brain performing various functions, there is no particular site for the superego, ego consciousness, or the *id*. Instead most cognition, conscious or unconscious, involves many areas of the brain (LeDoux 2002).

Assuming that certain drives are the basis for the unconscious has also outlived its usefulness. As Patrick Bateson (2000) has shown, all speculation based on drive 'starts to break down under closer scrutiny' (p. 202). And in terms of memories of childhood experiences, Freud's writing assumes what Schimek (1975) calls 'immaculate perception': accurate, if not exact, copies in the person's memory of what happened in early childhood, a possibility extensive research rules out (Schacter 1995, 2001).

Jung's theories labour under somewhat different difficulties, most of them related to his indebtedness to what we have learned about aboriginal cultures. Myths and communal beliefs were to him expressions of a common human constitution unaffected by historical circumstances. By finding parallels between anthropological data and the fantasies and dreams of his patients, he felt assured that he was dealing with ideations of a universal and timeless nature.

Even if instances could be found where such parallels exist, we have to assume that mytho-poetic expressions are formed in an interaction between genetic predispositions and cognitions acquired in adapting to particular historic and cultural circumstances (Tomasello 1999). When a mythic image appears in several locations and at various historic times, we cannot with certainty claim that it is due to a general propensity of the human brain to produce beliefs with specific features. Their occurrence would also have to express adaptations to certain conditions, conditions which may exist for long time-periods without having to be timeless.

Jung's theories also run the danger of assuming that there are certain fixed, genetically transmitted characteristics or behaviours (Jung 1929/1969). Although his arguments are sometimes contradictory, as Raya Jones (2004) has pointed out, philosophically speaking, Jung's is primarily a nativist argument and tends to ignore the plasticity and adaptability of the human brain (Siegel 1999; Karmiloff-Smith 2000). Indebted to classical philosophy (Plato

and Kant)<sup>2</sup>, he also seems to assume that heritability can be separated from the environmental factors, a possibility rejected by contemporary geneticists (Lewontin 1992)<sup>3</sup>.

### *A cacophony of theories*

Freud's and Jung's formulations about the unconscious do not in and of themselves diminish the value of the many clinical approaches which have developed from them. However, most psychoanalytic theories continue to be in use as if they were confirmed by research (Ekstrom 2002a). As a result, we have a cacophony of theories, all claiming superior results on the basis of some type of scientific validation, when, in fact, no analytic formulation, from any of the many schools of thought, can predict clinical outcome with any certainty. Psychoanalytic formulations about general psychology have become items of belief, doctrinaire exercises which are not open to review.

It is also increasingly clear, from years of studying psychotherapy outcomes, that a major factor in effective treatments is not the therapeutic techniques which these formulations advocate but the quality of the patient/therapist alliance, in particular the therapist's ability to promote such alliances (Luborsky et al, 1988; Ahn & Wampold 2001). How much the clinician's understanding of the unconscious plays a role—when it is based on current research and when it is not—is still an unknown variable, but professionally and ethically therapists have an obligation to base their methods on an understanding of sound research, broadly defined as this may be.

## Cognitive science

### *A philosophy in the flesh*

Many assumptions about the unconscious may unwittingly be informed by very traditional patterns of thought. The notion that certain universal truths

<sup>2</sup> For a discussion of Jung's philosophical sources, see Frey-Rohn (1969/1974) and Nagy (1971).

<sup>3</sup> R. C. Lewontin (1992), a leading geneticist at Harvard University, argues strenuously against the view that characteristics which appear to be universal are coded into our genes, into our DNA. Such views, he writes, reveal a narrow ahistorical perspective. Since genetics is a study of similarities and differences between relatives, we can only study heritability when there are differences between individuals. He writes: 'If everyone is identical in some respect, that is, if everybody has exactly the same genes for some characteristic, then there is no way of investigating its heritability, because genetic investigations require contrasts between individuals' (p. 97). In supporting an interactional view of the relationship between hereditary and environmental factors, Lewontin also writes: 'First, there is no 'environment' in some independent and abstract sense. Just as there is no environment without an organism. Organisms do not experience environment. They create them. They construct their own environment out of bits and pieces of the physical and biological world and they do so by their own activities' (p. 109). For a detailed account of how Jung's theory of archetypes has been received and interpreted, see also Knox (2003).

are forever implanted in humans is an idea strongly entrenched in Western culture. Two cognitive linguists and philosophers, George Lakoff and Mark Johnson, tackle the problems in this long tradition as the source of dualistic thinking about the mind/body dilemma (See also above). In their book *Philosophy in the Flesh* (1999) they argue that recent developments in cognitive science make it possible to overcome dualistic models while maintaining an empirical orientation.

Central to their argument is a new understanding of the unconscious which they call 'the cognitive unconscious'. They write:

Cognitive science is the scientific discipline that studies conceptual systems. It is a relatively new discipline, having been founded in the 1970s. Yet in a short time it has made startling discoveries. It has discovered, first of all, that most of our thought is unconscious, not in the Freudian sense of being repressed, but in the sense that it operates beneath the level of cognitive awareness, inaccessible to consciousness and operating too quickly to be focused on.

(p. 10)

Lakoff and Johnson (1999) distinguish between two areas of the unconscious. The first has to do with all our automatic cognitive operations: visual and auditory processing, and motor operations among them. The other, particularly relevant when we deal with memory, is what they call 'our implicit knowledge' and they claim that 'all of our knowledge and beliefs are framed in terms of a conceptual system that resides mostly in the cognitive unconscious' (p. 13).

As evidence for this, Lakoff and Johnson cite studies in neuroscience, cognitive linguistics, and neural modelling. In particular, their theories rest on findings by the Neural Theory of Language or NTL research group at the International Computer Science Institute (ICSI) at Berkeley to which they belong (p. 569). Using the neural modelling, complex computer simulations of cognitive processes, the NTL group has established ways to understand how basic categories or *prototypes* are tied to perception and motor movement.

The starting point of the Lakoff and Johnson argument is that all living systems must categorize and that the same neural mechanism that is used for perception and motor development is used for abstract reasoning. They write:

The existent proof comes from the field of neural modeling, and it comes in the following form. A neural model of a perceptual or motor mechanism is constructed and the very same mechanism is used for tasks as well. The conceptual tasks are of two sorts: (1) learning the structure of a semantic field of lexical items so as to get the relationship among the lexical items correct and (2) performing abstract inferences.

(p. 38)

So far the NTL team has developed three models. What they all have in common is that they describe how the brain carries out two things at

once—perception or motor control, on the one hand, conceptualizing, categorizing, and reasoning, on the other (Regier 1996; Bailey 1997; Narayanan 1997). The three models are:

1. Spatial-relations concepts, for example, those named by English words like *in*, *on*, *over*, *through*, and *under*.
2. Concepts of bodily movements, represented by verbs like *grasp*, *pull*, *lift*, *tap*, and *punch*.
3. Concepts indicating the structure of actions or events (what linguists call *aspectual concepts*) like *starting*, *stopping*, *resuming*, *continuing*, and *finishing*. Here are also included concepts indicating grammatically that something is in process (in English *is/are* plus the verb stem plus *-ing*: *is running*) or concepts for something completed (*has/have* plus the verb stem plus *-ed*: *has lifted*).

Since these concepts are about what the body does, perceiving and moving, these activities also shape the three concept groups. To Lakoff and Johnson (1999, p. 39), this means

- that our capacities for vision and negotiating space are used in constituting spatial-relations concepts and their logics;
- that our motor schemas and parameters of bodily movement structure those concepts and their logics;
- that the most common form of action, moving the body, is used to characterize aspectual structure, the structure we find in actions and events in general.

The NTL research group has also explored the cognitive mechanism in metaphors. So far they have traced two types of metaphors to their dual functions. The first of these they call ‘primary metaphors’. An example is ‘affection is warmth’—in other words, a subjective judgement, ‘affection’, is tied to a sensori-motor domain, temperature. They relate this metaphor to a primary experience, that of feeling warm while being held affectionately, and they hypothesize that primary metaphors such as ‘affection is warmth’ are established in early childhood and are due to what they call ‘conflation’, the lack of distinction between two conceptual domains.

Another type of metaphor, what Lakoff and Johnson call *complex metaphor*, they view as built around a primary metaphor and forms of common-place knowledge: cultural models, folk theories, or ‘simply knowledge or beliefs that are widely accepted in a culture’ (1999, p. 60). As an example of such a metaphor in our culture they mention ‘A purposeful life Is a journey’. Broken down into its constituent pieces, it reads:

- a purposeful life is a journey;
- a person living a life is a traveller;
- life goals are destinations;
- a life goal is an itinerary.

Lakoff and Johnson break down complex metaphors like this one into two primary metaphors and a set of cultural beliefs:

- a) purposes are destinations and action is motion are the primary metaphors;
- b) the cultural belief that everyone is supposed to have a purpose in life;
- c) the fact that a long trip to a series of destinations is a journey.

*From AI to memory structures*

This type of neural modelling is closely related to efforts to create computer programmes which can perform tasks similar to those of the human brain (Nadeau 1991). Also called artificial intelligence, these efforts often cross into cognitive science and the work of Roger Schank of Northwestern University Institute for Learning Sciences is perhaps the most fascinating in this regard. I have reported on his work in some previous papers (Ekstrom 2002a, b). Here I am mainly going to look at some of the conceptualization of the unconscious which has come from his work.

According to Schank (1999), a wide range of scripts or stories serve in memory storage. They do so because they are the most efficient way to remember a great number of events and because they can be continuously updated and indexed. However, much of the indexing happens without our awareness, non consciously, and, as most cognitive scientists, Schank (1990) has found little reason to believe that unconscious activities primarily are the result of Freudian repression. Instead he proposes that there is plenty of unconscious processing going on in the mind/brain of humans, not because we have to filter out threatening stimuli or impulses, but because many cognitive operations go on without conscious participation.

The narrative explanation of memory structures is the outcome of many years of frustrating experimentation, but the first step came when Schank and Abelson (1977) were able to describe certain basic memory scripts. The next step, documented in Schank's *Tell Me a Story* (1990), for the first time took advantage of the narrative understanding in literary criticism, narratology in particular.

To Schank, most learning begins with telling a story, which is also creating it. Once a story is created we can re-use it. This in turn makes reconstruction of missing or loosely connected details easier than creating a new story each time. He writes:

*We need to tell someone else a story that describes our experience because the process of creating the story also creates the memory structure that will contain the gist of the story for the rest of our lives. Talking is remembering... If we don't tell the story soon enough after the experience or often enough immediately after the experience or if we don't tell the story at all, the experience cannot be coalesced into a gist since its component pieces begin to mix with new information that continues to come in.*

(Schank 1990, p. 115)

Memorizing and learning are therefore tied to various types of narratives and these memory packets may be constructed in many different ways. However, they are all based on two particular activities which keep occurring once a narrative has been created: something unexpected and being reminded.

In the earlier version of his major work, *Dynamic Memory* (1982), Schank focuses on how learning depends on what he calls *expectation failures*. Confronted by such failures, we attempt to explain deviations from the original memory structure by further refining and elaborating and we do so by indexing memory structures we have already created.

He bases this idea on the fact that we take particular notice every time the expected *does not* happen. Without consciously having to decide, a new index will be created each time the unexpected occurs, so that any future occurrence of this circumstance can be accounted for.

The other memory mechanism, *reminding*, is further expanded in a later version of his work on memory, *Dynamic Memory Revisited* (1999). Since no two stories are exactly alike, Schank argues, retrieval must take place by searching for memory scripts with similar features and a match is made when we are reminded of a story of our own which is similar enough. We feel we have heard the other person and that we understand.

### *Non conscious memory and its packets*

Reminding explains how some memory structures are maintained, especially those that have to do with beliefs, predictions, and regular everyday events. However, when it comes to building abstractions and generalizations, which involve educational efforts, we also have to learn through experience, reflection, and explanation (Schank 1999, p. 107).

The latter two, reflection and explanation, are activities that we associate with memory and learning because they involve conscious effort. But Schank and his team have identified several other structures or 'memory packets', most of which are created without our awareness.

One such packet organizes scenes and since we remember in scenes, these are what he calls *MOPs*, Memory Organization Packets, which allow us to travel from scene to scene (1999, p. 123). Another, more complex structure is the *TOPs*, Thematic Organization Packets. These are packets that coordinate or emphasize the abstract significance of a combination of episodes and they are responsible for our ability to process abstract, domain-independent information (*ibid.*, p. 137).

When discussing these *TOP* packets, Schank concludes that knowledge has many facets, only some of which are conscious. There is the rational knowledge of acts necessary for logical thinking and there is the emotional knowledge of being able to identify how we feel. But beyond these two, there is also to Schank (1999) subconscious knowledge of which we are usually unaware of and a physical knowledge that our body uses which is mostly unconscious.

Finally, he assumes a non conscious knowledge which is being used in basic and ongoing mental activity. We are generally unable to articulate this activity as it occurs to us, but it can now be deduced from computer modelling.

### *Synapses and learning*

Both the Lakoff-Johnson team and Roger Schank use computational tools to study the mind-brain connection. The formulations of Joseph LeDoux, of New York University's Center for Neural Sciences, are the result of basic neuroscience. His research has been focused on the neural aspects of emotions, in particular fear (LeDoux 1998). His most recent publication, *Synaptic Self* (2002), is a broad review of the findings in neuroscience as well as the many still unanswered questions. Foremost, however, the book proposes a radical model for the self on the basis of the current findings. He writes:

Given the importance of synaptic transmission in brain function, it should practically be a truism to say that the self is synaptic. What else could it be? Not everyone, however, will be happy with my conclusion. Many will surely counter that the self is psychological, social, moral, aesthetic, or spiritual, rather than neural in nature. My synaptic theory of the self is not proposed as an alternative to these views. It is, rather, an attempt to portray the way the psychological, social, moral, aesthetic or spiritual self is realized.

(p. 3)

To LeDoux, synapses, more than any other part of the brain, hold clues to the classical dilemma of nature versus nurture, genetics versus learning. He argues that 'genes only shape the broad outline of mental and behavioural functions, accounting for at most 50 percent of a given trait, and in many instances far less' (p. 5).

Data from neurophysiological studies of learning and memory suggest synapses are modified by experience. Thus synapses represent an important aspect of brain plasticity (A. D. Ekstrom et al, 2001). This may not have been what most systems in the brain were designed for, but *synaptic plasticity* may now be viewed as 'an innately determined characteristic' (LeDoux 2002, p. 9). Who we are, our individual self, is the result of what he calls 'the particular patterns of synaptic connections in an individual's brain and the information encoded by these connections' (p. 3). Rather than the result of individual neurons working in isolation, many psychological and behavioural functions are mediated by cells joined by synapses and working together (p. 64).

A synaptic understanding by no means precludes the unconscious. Who a person is, what he or she thinks, feels, or does, is not only influenced by consciousness; almost everything that the brain does, involves one or more unconscious process. Discovering the mechanisms of consciousness would not explain how our brains work and how they make us the individuals we are. To LeDoux (2002), this means that we need to distinguish between two aspects of

the self. The first, *explicit* aspect, involves self-awareness (p. 27). By contrast, there is also an *implicit self* which he describes as ‘all other aspects of who we are that are not immediately available to consciousness, either because they are by nature inaccessible, or because they are accessible but not being accessed at the moment (pp. 27–8).

These implicit aspects make for a long list of processes we have no awareness of, such as (LeDoux 2002, p. 11):

- standard body maintenance like regulating heart rate, breathing rhythm, stomach contractions, and posture;
- many aspects of seeing, smelling, behaving, feeling, speaking, thinking, evaluating, judging, believing, and imagining.

Other aspects of the cognitive unconscious involve operations we may be conscious of, but only after the fact. So, for instance, when someone speaks to us, the following is done for us by our brains:

- decoding sentence meaning and sounds of words (phonology);
- assigning the proper meaning to words (semantics);
- knowing the grammatical relation between words (syntax);
- using our knowledge of the world (pragmatics).

Similar processes are present when speaking, only this time as the generator rather than the receiver.

### *Principles of neural systems*

The focus on synaptic plasticity, or learning, is a welcome change from the often mechanistic and deterministic approach by earlier neuroscientists. They were primarily concerned with the chemical agents involved in the communication between neurons, an approach often called *the soup model* (Valenstein 1998; LeDoux 2002). The development of drug treatments for a variety of mental disorders resulted from this approach, but when it comes to determining the causes for major illnesses such as depression, schizophrenia, and anxiety, research along these lines has so far fallen short (Valenstein 1998).

A far more productive approach has been the study of brain circuits. Several principles have emerged for how these circuits function. LeDoux (2002) finds that the following principles are supported:

- Neural systems function more or less independently and each carries out a separate function. However, they are all involved in encoding the same events. One system processes sight, another sounds, and still another, the smells in a given scene, thus ‘different systems experience the same world’ (p. 308–310).
- Neural systems work in parallel, that is, at the same time. This means that the firing of neurons in one system is simultaneous with the firing of many

others, across systems. Communication, also called *binding*, is accomplished because there is what is termed *parallel plasticity*, encoding all along the cells involved (p. 310–312). Such parallel processing may in fact occur synchronously, across regions, but here the research so far is incomplete.

- Parallel processing may also be coordinated by so called *modulators*, certain chemicals in the amine family which are released throughout the brain in the presence of significant stimuli (of something painful, novel, and unexpected). Although the modulators broadcast that something has happened, according to LeDoux, ‘they are less suited to identifying exactly what it is that’s happened’ (p. 313). However, they can promote plasticity at active synapses and they have an unusually long duration.
- Another way that learning occurs is via *convergence zones*, regions where information from diverse systems can be integrated (p. 315). These zones seem to be unique to mammals and are bigger in humans than any other mammal. Since they seem directly linked to cognitive sophistication, they must play a considerable role in how experiences are processed; convergence certainly increases the potential for integration between systems and may even influence them.
- One consequence of the presence of convergence zones in humans is the fact that neural processes which typically work more or less automatically, from bottom up, can be reversed. Such reversals or *downward mobile thoughts* work on the principle that cells processing a thought will change the connections of cells with which they communicate’ (p. 319), that is, conscious and cognitive activity may in certain instances also influence the other emotional and motivational circuits in the brain.
- Returning to the research which was the basis for his earlier book, *The Emotional Brain* (1998), LeDoux describes how *emotional states monopolize brain resources* as another principle. The brain has a number of emotional systems—detecting and defending against threat, but also identifying sexual partners and food sources—and when one of them gets activated, it tends to inhibit others.
- The last principle, *imperfection*, reflects the fact that implicit and explicit aspects of the self do not overlap completely (p. 322). Imperfection or dissociation happens when cognitive, emotional, and motivational brain systems become disconnected. One instance where this type of learning may occur is when the amygdala, as the circuit devoted to fear responses, is activated; it has the ability to learn independent of the cortex and cognition.

## Conclusions

### *Decoding the neural lessons*

These principles for brain circuit operations are based mostly on data from animal studies. Thus they primarily shed light on how the brain learns, i.e.,

how it encodes information and how communication between neural structures occurs. On the basis of these principles, approaches to various mental disorders as forms of *synaptic sickness* may eventually develop (LeDoux 2002, p. 266ff). However, before the data about brain circuit operations can be translated into a more precise clinical theory, knowledge about neural and relational phenomena in humans, specifically when involving psychotherapeutic exchange, will be required (Solms & Turnbull 2002).

Although such data are still lacking, the models of neuroscientists are now being explored by many psychologists concerned with research about psychotherapeutic change. Louis Cozolino (2002), of Pepperdine University, in his bold and integrative attempt, *The Neuroscience of Psychotherapy*, focuses on two specific criteria for exploring how such change occurs: neural network growth and integration. He assumes that 'any form of psychotherapy is successful to the degree to which it enhances positive experiential change and underlying neural network growth and integration' (p. 315).

With these criteria in mind, Cozolino (2002) outlines six ways psychotherapy addresses neural systems. They are (p. 27):

1. The establishment of a safe and trusting relationship.
2. Gaining new information and experiences across the domains of cognition, emotion, sensation, and behaviour.
3. The simultaneous or alternating activation of neural networks that are inadequately integrated or dissociated.
4. Moderate levels of stress or emotional arousal alternating with periods of calm and safety.
5. The integration of conceptual knowledge with emotional and bodily experience through narratives that are co-constructed with the therapist.
6. Developing a method of processing and organizing new experiences so as to continue ongoing growth and integration outside of therapy.

LeDoux's (2002) principles for brain circuit communication, outlined above, all deal with neural network change or alternation as well. In fact, they specifically describe synaptic plasticity and how connections between neural systems are constantly being changed by experience. Thus it is reasonable to assume that psychological growth and integration in psychotherapy happen because communication between brain circuits has been stimulated and that one or more of the processes described by LeDoux has been activated (Solms & Turnbull 2002; Knox 2003).

The second principle, for instance, involving synchronous binding across brain regions, seems particularly relevant to what happens in psychotherapy, since it could explain how information may be integrated across the domains of cognition, emotion, sensation, and behaviour. LeDoux (2002) mentions recent studies using computer simulation as holding a great deal of promise. He writes: 'Exploration across systems is going to be especially crucial as we try to come to grips with the relation of the self to the brain' (p. 312).

The third principle, of parallel plasticity being coordinated by modulatory systems, is significant when it comes to understanding the role played by arousal. Several researchers have found that optimal arousal enhances memory storage (van der Kolk & Greenberg 1987; McGaugh 1999; van der Kolk 1996). There is also evidence that too much arousal may inhibit plasticity. This leads Cozolino (2002) to propose that in psychotherapy a balance between nurturance and stress maximizes ‘the ability of networks to process and integrate information’ (p. 62).

The binding across regions that LeDoux (2002) discusses is certainly what any good psychotherapy tries to accomplish and the fourth principle, *convergence zones*, in particular, deals with how the human brain accomplishes integration and self assembly. Since convergence happens hierarchically—and the increasingly sophisticated processing of an experience forms entire ensembles of cells—, mental and behavioural functions, as well as language comprehension, may be accomplished by convergence zones (pp. 317–8).

The cognitively directed activity defined as *downward mobile thoughts* seems to describe what we usually associate with learning, i.e., conscious processing. According to this principle, what psychotherapists call insight or understanding may also impact on emotional and motivational circuits in the brain. Language may in fact be one of the tools with which reflexive and abstract connections between concrete elements of perception and memory occur (Solms & Turnbull 2002).

The sixth principle, *emotional systems*, describes how certain memory structures of lasting duration are established and how their activation inhibits other systems. Detecting and defending against threat, as well as identifying sexual partners and food sources, involves arousal which tends to penetrate widely and perpetuate itself (Wilkinson 2004). The learning and memory structures from such states reflect, among other things, in the negative impact of childhood trauma (LeDoux 2002, p. 322).

Finally, the seventh principle, *imperfection*, describes a phenomenon when cognitive, emotional, and motivational brain systems become disconnected. Perhaps this is the price we humans have to pay for our cognitive capacities, but imperfection makes our conscious, explicit self less in charge of the emotional systems which play such a critical role in coordinating learning. Thus LeDoux’s final principle may in fact explain why emotion and the implicit self needs to be consulted in psychotherapies wishing to produce lasting change.

### *Yet another unconscious?*

A period of more than 50 years separates the formulations of Freud and Jung’s attempts from those by today’s cognitive scientists. Nevertheless, there are some obvious ways that the old and the new models connect.

Freud had the foresight of looking to the brain for answers. His efforts could not bear fruit using the mechanistic understanding available at the time,

but new technology is finally allowing the neurology of the mind he envisioned. Jung, on the other hand, intuited the complex participation of images and ideas for which no conscious account is possible. The linguistic and computational modelling now being used by researchers has opened this frontier as well and there is considerable data to support the existence of many unconscious formations he intuited. At least in this sense, the explorations of the unconscious now under way are in fact a continuation of what the pioneers of psychoanalysis began.

The old and the new formulations also connect in specific ways. The more we move up the ladder in cognitive research, from basic neurophysiology to computational models of stories and metaphors, the easier it is to see these connections. The understanding that metaphors are based on physical experience may explain how certain sensate experiences in childhood form metaphor for religious enlightenment later in life (Cozolino 2002, p. 147). Similarly, the stories which emerge out of the therapeutic relationship may also be 'what is required for wiring and rewiring through the simultaneous or alternating activation of feelings, thoughts, behaviour, and sensation' (*ibid.*, p. 170).

However, this means that explanations for how the unconscious functions have radically changed. Roger Schank's description of narratives and their non-conscious indexing are, on the surface, akin to depth psychology, but, at closer scrutiny, they shatter old ideas of why stories are told, how our mind uses them, and why they are being remembered. No more is the focus on a latent level of meaning in a given narrative but on how we find meaning by using certain memory structures which are dynamically changing as we integrate new experiences. Stories are no longer conscious elaborations of experiences but the necessary cognitive structures for remembering and making meaning of otherwise lost experiences.

The understanding of metaphors that Lakoff and Johnson offer us can be equally unsettling if we assume that there are innate expressions for the symbols that form in treatments. As Knox (2004) points out, such innateness must be ruled out simply on the basis of what can be stored genetically. Recent clinical accounts also seem to confirm that the ability to symbolize is acquired (Bovensiepen 2002). The work of the NTL research group at Berkeley instead indicates that certain simple metaphors describe prototypes we use based on bodily and sensate functions. These prototypes seem to originate in how the young child learns when still lacking the ability to distinguish between two conceptual domains.

### *Areas of clinical utility*

The task for today's clinicians is finding ways to integrate the new data about the unconscious. It is a daunting task, but it has already begun. I will not try to mention all these contributions, but instead focus our discussion on what the new research may help us with.

1. The new data should allow us more precise understanding of how the analyst's memory works and in what ways the analyst learns to use it (Ekstrom 2002b). How the analyst structures the encounter via his or her particular way of remembering and ascribing meaning to the relational data is of critical concern when it comes to training. We have neglected to search for ways to establish what effective analysts have in common and how they develop their unique abilities.
2. The new data offer further understanding of psychopathology and diagnosis and may make it possible to pin point more precisely certain aspects of the patient's problems. The findings of Joseph LeDoux and others show us several instances in which what was lost in the DSM-III/DSM IV versions of diagnosis, the particular causes for mental disorders, may gradually be brought back. The data from neuroscience also seem to turn the table on the simplistic and market-driven claims of mental disorders being caused by a chemical imbalance in the brain (Valenstein 1998).
3. The new data allow us to review our understanding of early childhood conditions. Especially studies in attachment theory may have broad consequences in how we view many central issues about treatment, in particular about transference/countertransference (Knox 2003). The work of Peter Fonagy and his colleagues at University College London (2001; 2002), which places the theories of Bowlby in a neuroscientific framework, is particularly instructive in this regard.
4. The new data shed some light on dreaming and dreams, the main source for a psychoanalytic understanding of the unconscious. Although there is still disagreement about what function dreaming has neurologically, there is an emerging agreement that dreams may have to do with how experiences are recorded into long-term memory and that dreaming, as a distinct state of mind, has things in common with other particular experiences, such as altered states, hypnotic states, and psychosis (Hobson 2001; Solms & Turnbull 2002).

However, before we translate these findings into the language of particular analytic theories about the unconscious, I think we are wise to listen to an early warning by Fischer and Pipp (1984). They write:

... the unconscious is a type of process—a way of *constructing* perception, memories and other kinds of cognition that changes systematically with development. It is not a portion of the mind.

(p. 91)

The spatial and mechanical metaphors so common in psychoanalytic language sometimes trick us into treating unconscious ideas as if they proved the existence of portions of the mind or the brain where the unconscious dwells. The findings of cognitive research do not justify such uses. The term 'the unconscious' only signifies something that was formed, even if it functions outside

our awareness, by a combination of genetic and environmental influences. If formed in early life, such learning may also be attributed to developmental plasticity and the particular conditions which exist from 10 to 18 months of age (Schore 1994)<sup>4</sup>.

### *Therapeutic change as neural*

We can now safely say that many of the things that our patients do and say in treatments reflect unconscious activity. However, their unconscious is not merely the seat of drives. It is not limited to past experiences or underlying collective patterns of experiencing. What they bring to the treatment are ways of experiencing themselves and the world which involve a range of unconscious processes. So will the treatment itself.

As analysts, we also bring an active unconscious to each treatment. Many of the things that happen in a given therapy hour we will not remember. In fact, we will mostly remember what we can connect to some previous memory structure. On the other hand, we will absorb things about our patients of which we may not have a fully conscious account, especially when it involves our emotional brain systems.

We must contend with the fact that much of the unconscious, as seen in a neuroscientific light, cannot be made conscious, in ourselves or in our patients. Merely by focusing on memory and emotions, we will have to accept that there are neural operations involved which go far beyond what our theories and our techniques are able to describe.

On the other hand, the recent emphasis on synaptic plasticity and connections between neural systems, constantly being changed by experience, has moved us closer to an appreciation of psychotherapy as promoting learning. Such learning, under optimal circumstances, has physiological consequences and lasting change may in fact occur. As David Tresan (1996) states, such change is 'not only in subjectivity and psyche but in neural substrate as well' (p. 416).

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### TRANSLATIONS OF ABSTRACT

Plusieurs branches des sciences cognitives actuelles se sont intéressées à la nature de l'inconscient. Cet article est une exploration des découvertes et modèles développés dans ces recherches. En introduisant des formulations qui sont basées sur des données non cliniques, les scientifiques cognitivistes—de la neuro-linguistique, des processus d'information, et de la neuroscience—repartent des formulations psychanalytiques premières. Une compréhension des processus inconscients au niveau des neurones est de

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<sup>4</sup> How developmental plasticity differs from regular learning, aside from the fact that it describes learning during infancy, is not clear. However, Siegel (1999) advocates for a special emphasis on developments in the infant and sensitive periods in early childhood.

toute façon en train d'émerger: on voit comment les synapses sont modifiés par l'expérience et on voit que la capacité à apprendre, consciente et inconsciente, repose sur cet aspect important du cerveau qu'est sa plasticité. Les formulations de Freud et de Jung sur la psyché inconsciente, qui représentent les principales positions de la psychologie des profondeurs reposent, elles aussi, sur une conception de l'esprit qui s'étend au-delà de la conscience immédiate. Cependant leurs modèles sont plus hypothétiques du fait que leurs données viennent presque exclusivement des traitements de patients en psychothérapie et de ce que ces derniers expriment. En quoi ces deux conceptions se rejoignent-elles et en quoi diffèrent-elles? Et comment la compréhension du fonctionnement des neurones que nous donne les recherches actuelles, peut-elle soutenir les pratiques et théories des traitements analytiques?

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Mehrere Zweige der kognitiven Wissenschaft konzentrieren sich jetzt auf das Wesen des Unbewussten. Die vorliegende Arbeit untersucht einige Ergebnisse und Modelle aus dieser Forschung. Durch die Einführung von Formulierungen, die auf nicht klinischen Daten beruhen, könnten sich die Kognitionswissenschaftler—in Neurolinguistik, Computerwissenschaft und Neurowissenschaft—von den älteren psychoanalytischen Ausdrucksweisen entfernen. Ein Verständnis für unbewusste neurale Prozesse entwickelt sich dennoch und zeigt, wie sich Synapsen (Nervenschaltstellen) durch Erfahrung verändern, und wie das Lernen, bewusst oder unbewusst, auf diesem wichtigen Aspekt der Gehirnplastizität beruht. Freuds und Jungs Formulierungen über das Unbewusste der Psyche, welche die Grundlagen der Tiefenpsychologie bilden, basieren auch auf der Vorstellung geistig—seelischen Lebens, welches über das unmittelbare Bewusstsein hinausreicht. Dennoch sind ihre Modelle eher hypothetisch, weil ihre Daten fast ausschließlich aus Behandlungen von Psychotherapiepatientinnen und—Patienten und deren sprachlicher Mitteilungen stammen. Wo stimmen diese beiden Konzeptionen des Unbewussten überein, und wo unterscheiden sie sich? Und wie hilft das Verständnis neuraler Vorgänge in der gegenwärtigen Erforschung der Theorie und Praxis analytische Therapie?

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Molti rami della scienza cognitiva si focalizzano oggi sulla natura dell'inconscio. Questo lavoro esamina alcune scoperte e modelli che provengono da tale ricerca. Introducendo formulazioni basate su dati non-clinici, gli scienziati cognitivi—elle linguistica neurale, nei modelli computazionali e nelle neuroscienze—possono partire da formulazioni psicoanalitiche più vecchie. La comprensione di processi neurali inconsci emerge tuttavia mostrando in che modo le sinapsi vengono modificate dalle esperienze e in che modo l'apprendimento, conscio o inconscio, è dovuto a tale importante aspetto della plasticità del cervello. Le formulazioni di Freud e di Jung sulla psiche inconscia, che rappresentano i principi di fondo della psicologia del profondo, sono anch'essi basati sulla concezione di una mente che si espande al di là della consapevolezza immediata. Tuttavia i loro modelli sono più ipotetici dal momento che i loro dati provengono, quasi esclusivamente dal trattamento di pazienti in psicoterapia e dai loro resoconti verbali. In cosa quindi queste due concezioni dell'inconscio coincidono e dove differiscono? E in che modo la comprensione neurale nella ricerca attuale supporta nella teoria e nella pratica il trattamento analitico?

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Diferentes ramas de la ciencia cognitiva actualmente se enfocan hacia la naturaleza del inconsciente. En este trabajo se exploran algunos modelos y descubrimientos procedentes de esta investigaciones. Por medio de la introducción de datos no clínicos, los científicos cognitivos en 'neurolingüística, modelaje computorizado y neurociencia' pueden apartarse de la antigua formulación psicoanalítica. Sin embargo, está surgiendo un nuevo entendimiento de los procesos neuronales inconscientes mostrando como las sinapsis son modificadas por la experiencia y como el aprendizaje, consciente e inconsciente, está relacionado con esta plasticidad del cerebro. Las formulaciones de Freud y Jung sobre la psique inconsciente, representando los principios fundamentales de la psicología profunda, están así mismo basados en la concepción de una mente que se extiende mas allá de la conciencia inmediata. De cualquier manera, sus modelos son mas hipotéticos en ellos y sus datos, casi exclusivamente, provienen de tratamientos de pacientes en psicoterapia y sus relatos verbales. Así, cómo es que estas dos concepciones del inconsciente se integran, y donde ellas difieren? Y, Cómo la comprensión neuronal en el presente estudio sustenta la teoría y la práctica analítica?

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