

Imagination and the Meaningful Brain

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2

Metaphor, Memory, and Unconscious Imagination

The imagination is one of the highest prerogatives of man. By this faculty he unites former images and ideas, independently of the will, and thus creates brilliant and novel results. . . . The dream is an involuntary [kind]¹ of poetry.

Charles Darwin

Cognitive linguists Lakoff and Johnson (1999) affirm what has long been known: *the source of the imagination, what makes us uniquely human, is an unconscious metaphoric process.* Unconscious autobiographical memory, the memory of the self and its intentions, is constantly recontextualized, and the link between conscious experience and unconscious memory is provided by metaphor. This suggests that the metaphoric process that we recognize in our dreams is also continuously operative while we are awake.

Metaphor as the Currency of Mind

The philosopher Mark Johnson and the linguist George Lakoff (Lakoff and Johnson 1980, Johnson 1987, Lakoff 1987, Lakoff and Johnson 1999) have shown that metaphor is not

simply a figure of speech but is primarily a form of thought, a form of cognition. As metaphor is a mode of cognition, metaphor can function as an interpreter of unconscious memory. Our emotional and imaginative life is literally unthinkable apart from this unconscious metaphoric process. As the late novelist and philosopher Iris Murdoch observed, "The development of consciousness in human beings is inseparably connected with the use of metaphor. Metaphors are not merely peripheral decorations or even useful models, they are *fundamental forms of our condition*" (1970; my emphasis). Murdoch's reference to "peripheral decorations" is a specific allusion to Aristotle's concept of metaphors as merely peripheral decorations of language. For centuries, philosophers and linguists, following Aristotle, understood metaphor to be merely a figure of speech, a departure from literal meaning. Aristotle's theory of metaphor has had a remarkable longevity, as philosophers of language and linguists have until recently unquestioningly accepted his definition of metaphor. Aristotle described metaphor as an analogy whose use is a mark of excellence. Aristotle wrote,

A metaphorical word is a word transferred from the proper sense; either from genus to species, or from species to genus, or in the way of an analogy. (1934, p. 40)

The greatest excellence [in the use of words] is to be happy in the use of metaphor; for it is this alone which cannot be acquired, and which, consisting in a quick discernment of resemblances, is a certain mark of genius. (1934, p. 45)

Cognitive linguistics has demonstrated that Aristotle was mistaken in thinking that metaphor is merely a part of speech. Metaphor is a fundamental and uniquely human cognitive ability, a primary form of cognition and thought

that becomes secondarily incorporated into language (Johnson 1987, Lakoff 1987, Turner 1991, Gibbs 1994, Lakoff and Johnson 1999). That metaphor exists apart from language is evident in gestures, visual images, feelings, and bodily sensations, which can all function as metaphors. Merlin Donald (1991) has speculated that in the evolution of our species, metaphoric gesture may have preceded the appearance of language. (A discussion of this hypothesis regarding the separate evolution of metaphor appears in chapter 10.) The acquisition of metaphor has probably had a separate evolutionary history; language and metaphor may represent coevolutionary processes.

I define *metaphor*, as does cognitive linguistics, as *a mapping or transfer of meaning between dissimilar domains (from a source domain to a target domain)*. Metaphor not only *transfers* meaning between different domains, but by means of novel recombinations metaphor can *transform* meaning and generate new perceptions. Imagination could not exist without this recombinatory metaphoric process.

As a mode of cognition, metaphor is doubly embodied, first, as an unconscious neural process and, second, in that metaphors are generated from bodily feelings, so that it is possible to speak of a corporeal imagination.

The Scientific Imagination as an Unconscious Metaphoric Process

Since the nineteenth century it has been known from the following often quoted account given by the chemist Friedrich August von Kekulé that the creative imagination of scientists can be both involuntary and unconscious. Kekulé described how his discovery of the closed-carbon-ring

structure of organic compounds occurred unconsciously in a dream. He related that one afternoon in 1865 he fell asleep:

I turned my chair to the fire and dozed, he relates: Again the atoms were gambolling before my eyes. This time the smaller groups kept modestly in the background. My mental eye, rendered more acute by repeated visions of this kind, could now distinguish larger structures, of manifold confirmation; long rows, sometimes more closely fitted together; all twining and twisting in snakelike motion. But look! What is that? One of the snakes had seized hold of its own tail and the form whirled mockingly before my eyes. As if by a flash of lightning I awoke. . . . Let us learn to dream, gentlemen. (Koestler 1964)

That an analogous unconscious process occurs while one is awake is illustrated by an equally famous account of the creativity of the unconscious. Below is an account of the French mathematician Henri Poincaré's discovery or invention of what is called *Fuchsian* functions. Poincaré was convinced that his mathematical creativity was a product of the unconscious mind. He wrote, "Most striking at first is this appearance of sudden illumination, a manifest sign of long, unconscious prior work. The role of this unconscious work in mathematical invention appears to me incontestable." Poincaré provided the following reminiscence:

Just at this time, I left Caen, where I was living, to go on a geological excursion under the auspices of the School of Mines. *The incidents of the travel made me forget my mathematical work.* Having reached Coutances, we entered an omnibus to go someplace or other. At the moment when I put my foot on the step, the idea came to me, without anything in my former thoughts seeming to have paved the way for it, that the transformations I had used to find the Fuchsian functions were identical with those of non-Euclidian geometry. I did not verify the idea; I should not have

had time, as, taking my seat in the omnibus, I went on with the conversation already commenced, but I felt a perfect certainty. On the return to Caen, for conscience's sake, I verified the result at my leisure. (From Hadamard 1945; my emphasis)

Poincaré's unconscious process was primed by his intentionality, his intense desire to discover a solution, but it was then necessary for him divert his attention from this task; as he notes, "The incidents of the travel made me forget my mathematical work."

That the metaphoric process functions apart from language is beautifully illustrated in the following account provided by Einstein in response to an inquiry from the French mathematician Jacques Hadamard, who was investigating the role of the unconscious in mathematical thought.

The words or the language, as they are written or spoken, do not seem to play any role in my mechanism of thought. The psychical entities which seem to serve as elements in thought are certain signs and more or less clear images which can be "voluntarily" reproduced and combined.

There is, of course, a certain connection between those elements and relevant logical concepts. It is also clear that the desire to arrive finally at logically connected concepts is the emotional basis of this rather vague play with the above-mentioned elements. But taken from a psychological viewpoint, this *combinatory play* seems to be the essential feature in productive thought—before there is any connection with logical construction and words or other kinds of signs which can be communicated to others.

The above-mentioned elements are, in any case, *some of visual and some of muscular type*. Conventional words or other signs have to be sought laboriously only in a secondary stage, when the mentioned associative play is sufficiently established and can be reproduced at will.

According to what has been said, the play with the mentioned elements is aimed to be analogous to certain logical connections one is searching for. In a stage when words intervene at all, they

are, in any case, purely auditive but they interfere only in the secondary stage as already mentioned. It seems to me that what you call full consciousness is a limit case which can never be fully accomplished. This seems to me connected with the fact called the narrowness of consciousness. (Hadamard 1945; my emphasis)

This excerpt from Einstein's letter to Hadamard does not refer directly to an unconscious process; rather, he refers to the "narrowness" of consciousness. He described the "play" of visual images and, more remarkably, the play of muscular (kinesthetic) sensations, which we can infer are the products of an unconscious metaphoric process. Only later and secondarily does Einstein revert to language in consideration of the need for communication to others.

The metaphoric process, when operating apart from language, can process fragmentary visual, auditory, and other bodily sensations. The metaphoric transfer of meaning can also occur between different sensory modalities, no matter how fragmented the elements are, such as isolated sounds of speech. I am reminded of a game described by the art historian Ernst Gombrich (1960). He invited the reader to play a game in which language consisted only of two words: *ping* and *pong*. If we had to name an elephant and a cat, the answer is evident, for *pong* is "heavier" and therefore means elephant. So that when Einstein reports that he *plays with* visual, auditory, and muscular elements, I have no doubt that he is describing a metaphoric process.

The French mathematician Alain Connes described an unconscious process that generates mathematical thought.² Connes affirms the unconscious nature of mathematical thought in a published dialogue with the neurobiologist Jean-Pierre Changeux (Changeux and Connes 1995). Connes also observed, as did others, the need to suspend conscious

intention for an unconscious process to take place. Connes summarizes his observations:

- There must be a conscious intention of what one wishes to achieve.
- Then this intention must be placed aside.
- One must allow for a period of germination or incubation.
- The unexpected solution appears at times accompanied by great ecstatic joy.
- This is followed by a period of critical evaluation.

Connes reports: "I've often observed too that once the first hurdle of preparation has been gotten over, one runs up against a wall. The main error to be avoided is trying to attack the problem head-on. During the incubation phase, you have to proceed indirectly, obliquely. If you think too directly about a problem, you fairly quickly exhaust the usefulness of the tools accumulated in the course of the first phase, and are apt to become discouraged. Thought needs to be liberated in such a way that subconscious work can take place." Changeux responds: "Is it a matter simply of giving working memory enough to do and giving greater rein to an unconscious process that relies more on long-term memory? Or is it, to the contrary, a kind of associational procedure that takes time because the elements that need to be put together belong to rather different contexts?"

I would reply to Changeux's question by suggesting that the unconscious creative imagination utilizes both (unconscious) long-term memory and an associative process linked by means of metaphor. This is what consumes time during the incubation period. Working memory merely initiates the process of conscious (and unconscious) intention as the day residue incubates a dream.

Does an Unconscious Metaphoric Process Have Neural Correlates?

Let us assume that there is an unconscious metaphoric cognitive process operative in the waking state. What then might be the neural correlates of such a process? The hypotheses that I shall describe are only reasonable surmises that reflect an investigator's imagination, but for this reason alone they should not be depreciated. D. O. Hebb has commented, "When used by theorists outside of neurology, 'CNS' should be understood to stand not for 'central nervous system,' but for 'conceptual nervous system'" (cited in Kitcher 1992).

Metaphor formation is intrinsically multimodal, as it must engage visual, auditory, and kinesthetic inputs. In addition, metaphor formation must access unconscious memory. It is a reasonable assumption, inasmuch as the capacity for metaphoric thought is uniquely human, that the prefrontal association cortex, which is significantly enlarged in humans as compared to primates, is active in unconscious metaphor formation (Deacon 1997). It is also known that this area of the brain has rich connections with the limbic system. Some investigators (Bottini, Corcoran, et al. 1994) suggest that the metaphoric process is predominately within the right hemisphere, but as metaphor utilizes global multimodal inputs, I would remain skeptical of such claims.

It is not too difficult to specify what is *not* likely to be the neural correlates of the metaphoric process. The neural correlates of the metaphoric process are not at all likely to be represented by point-to-point invariant maps, such as have been described for visual perception. As we know more about visual perception than any other cortical function, this specialized area of neurophysiology has become a paradigm

from which theories regarding other higher functions of the human mind, such as consciousness and meaning construction, are extrapolated (see, for example, Crick 1994, Pinker 1997). Investigation of the neurophysiology of vision has shown a fixed topographic relation between the receptor cells and the target areas of the cerebral cortex. Further, patterns of neural activity in the retina correspond faithfully to the spatial and temporal details of visual inputs (Tononi and Edelman 1998). In contrast, the neural correlates of metaphoric imagination must be nonlinear and indeterminate. It seems likely that *different domains of the mind operate in accordance with different rules*.

I believe that the selectionist theories of Gerald Edelman (1987, 1989, 1992) and Jean-Pierre Changeux (1997) and the neural dynamics described by Freeman (1999b) offer a more promising paradigm. Edelman proposes a process called *global mapping*. Unlike the relative point-to-point fixation of maps from the retina to the visual cortex or from the musculature to the motor cortex, Edelman believes that maps of higher mental functions are indeterminate. In accordance with his theory of neuronal group selection, neuronal maps do not depend on preexisting codes. This indeterminacy results from what is called a selectionist principle. Edelman proposed that a *somatic selection* analogous to Darwinian natural selection occurs at the level of synapses and neuronal cells within the brain. The selection process takes place in somatic time and is driven by experience and the extensive variability of neural circuitry and neuronal cells (see Edelman 1992 and, for an overview, Edelman 1998).³

What is uniquely human is a generative imagination from which the individual can create an internal unseen world. If the neural correlates of a metaphoric process are established, it is likely to reflect some form of bootstrapping,

some form of the brain's "turning around upon its own schemata," something analogous to what has been described by Edelman as a "higher order" consciousness that incorporates a capacity for self-reflection. Edelman proposed that a "higher order" consciousness is multilayered and complex, as compared to a comparatively less complex *primary consciousness*, which is "the remembered present" (1992, p. 109). Edelman does not directly propose a neural theory of metaphor or of imagination, but he does suggest that higher mental functions such as the formation of conceptual categories may reflect "higher-order maps," that to construct conceptual categories the brain constructs maps of its own activities, that the brain makes maps of its own maps, which are not fixed topographically. Indeterminism is a necessary attribute of such higher-order functions.

It is likely that the neural correlates of an unconscious metaphoric process would be unpredictable and indeterminate. J. A. Scott Kelso (1999) describes this "functional instability" as a notable characteristic of the brain. The neural correlates of a metaphoric process are likely to be nonlinear.⁴

The French neuroscientist Jean-Pierre Changeux (1997, p. 169) described a plausible hypothesis regarding the neural properties of the "substrate" of imaginative thought. Changeux, who with Edelman is also committed to a neuronal selectionist theory, emphasized the indeterminate nature of what he described as spontaneous recombinations between neural assemblies (maps).

The neurons participating in such assemblies will be both dispersed and multimodal, or perhaps amodal. This should bestow on them very rich "associative" properties, allowing them to link together and above all to combine. Thus, it becomes plausible that such assemblies, made up of oscillatory neurons with high *spontaneous* activity, could recombine among themselves. *This recombina-*

ing activity would represent a "generator of hypotheses," a mechanism of diversification essential for the genesis of prerepresentations and subsequent selection of new concepts. In a word, it would be the substrate of imagination [my emphasis]. It would also account for the "simulation" of future behavior in the face of a new situation. For a system to organize itself, it is obvious that there must be more than simple creation of diversity. A selection is possible, as we have seen, by a comparison of mental objects in terms of their resonance or dissonance. (Changeux 1997, p. 169)

In *Conversations on Mind, Matter, and Mathematics* (Changeux and Connes 1995), Changeux identifies the prefrontal cortex as the area in which such associations are likely to take place. *Let us hypothesize that such associations are formed unconsciously by means of the metaphoric process that combines previously unconnected experiences.* Arthur Koestler expressed a similar idea, referring to metaphor as a bisociative act: "The bisociative act connects previously unconnected matrices of experience; it makes us understand what it is to be awake, to be living on several planes at once" (1964, p. 48). Koestler's idea that metaphor allows one to live "on several planes at once" is precisely what I wish to convey.

Metaphor and the Recontextualization of Memory

The hypothesis of an unconscious metaphoric process must be linked to memory. I believe that our unconscious autobiographical memory, in which emotion is salient, forms potential categories by means of metaphor. To convince you of the reasonableness of this hypothesis, I will describe two theories of memory: one proposed by Freud and the other by Edelman. If memory is organized in accordance with an unconscious metaphoric process, we must assume

that autobiographical memory, memory of the self and its intentions, is extremely plastic and subject to constant recontextualization.

I noted in *Other Times, Other Realities* (Modell 1990) the similarities between Freud's theory of memory and Edelman's. Freud and Edelman described memory as a recontextualization. Freud referred to the retranscription of memory as *Nachträglichkeit*, which can be literally translated as a retrospective attribution.⁵ Freud's theory of memory as a recontextualization first appeared in a letter from Freud to Fliess dated December 6, 1896 (Masson 1985):

As you know, I am working on the assumption that our psychic mechanism has come into being by process of stratification: the material present in the form of memory traces being subjected from time to time to a *rearrangement* in accordance with fresh circumstances—to a *retranscription*. Thus what is essentially new about my theory is the thesis that memory is present not once but several times over, that it is laid down in various kinds of indications. . . . I should like to emphasize the fact that the successive registrations represent the psychic achievement of successive epochs of life. At the boundary between such two such epochs a translation of the psychic material must take place. I explain the peculiarities of the psychoneurosis by supposing that this translation has not taken place in the case of some of the material, which has certain consequences.

One basic function of memory is the detection of novelty, the detection of similarity and differences within the ever-changing flood of perceptions from inside the body and from the outer world. The sorting of similarity and difference is another way of describing category formation. Categorization is a function of memory, and memory, in turn, is a property of neural systems. Memory, an ancient property of biological systems, can be broadly defined as the abil-

ity to repeat a performance under changing contexts. I quote now from Edelman 1998:

Memory has properties that allow perception to alter recall, and recall to alter perception. It has no fixed capacity limit, since it actually generates "information" by construction. It is possible to envision how it could generate semantic capabilities prior to syntactical ones. If such a view is correct, *every active perception is to some degree an act of creation, and every act of memory is to some degree an act of imagination.* (My emphasis)

Edelman viewed memory as invariably linked to category formation. 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" (Edelman 1989, p. 4). Therefore, the primordial task faced by the brain is that of labeling an unlabeled world. This is accomplished by means of perceptual and conceptual categories. "A memory is the enhanced *ability* to categorize associatively, not the storage of features of attributes as lists" (Edelman 1987, p. 241). In this sense, memory is not representational (this point is enlarged on in Edelman 1998). 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).

As I noted, some cognitive scientists assume that memory is representational, that memory consists of a codelike record that once corresponded to experience. If memory is representational, the activation of a memory would consist of a static process analogous to retrieving items from a storage bank. Edelman's theory of recategorization evokes a very different concept. Memory retrieval is selective, depending on the context of the immediate experience. Memory does

not capture a coded representation but is itself a construction. Unconscious memory exists only as a latent *potential* awaiting reconstruction.

Psychic Trauma and the Impaired Recontextualization of Memory

Clinical observation leads to the unmistakable conclusion that psychological trauma may result in a failure to recategorize or recontextualize memory. The inability to recontextualize memory determines whether a given experience will prove to be traumatic. As we have different methods at our disposal with which to recategorize memory, individuals will react to trauma in their own particular way, so the effect of a given environmental trauma is variable and unpredictable. When there is an inability to recontextualize memory, the experience of the present, the here and now, will be pervaded by memories of the past. In this fashion, trauma will constrict the complexity of consciousness.

The process of the retrieval of traumatic memories gives further support to the hypothesis that an unconscious metaphoric process is operative in the waking state. As the critic and novelist Cynthia Ozick writes, "Metaphor [like the Delphic oracle] is also a priest of interpretation, but what it interprets is memory" (1991). When metaphor is the interpreter of traumatic memories, it interprets with the aid of metonymy (a part substituting for the whole), and metaphoric memorial categories are evoked by metonymic associations. But trauma can be self-sustaining, as trauma will degrade the metaphoric process: here the metaphoric process transfers meaning from the past to the present *without transformation*, and as a consequence imagination is constricted. The past becomes a template for the present, creat-

ing a loss of ambiguity in the experience of the here and now; there is an absence of the customary play of similarity and difference. In experiential terms, this means that the present is conflated with the past.

In an example I used in my book *Other Times, Other Realities* (1990), a patient reported the following incident: Because his airline went out on strike, my patient was stranded in a distant city and unable to return home. He did everything possible to obtain passage on another airline: he cajoled and pleaded with the functionaries of other airlines, all to no avail. Although my patient was usually not unduly anxious and was in fact a highly experienced traveler who in the past remained calm under circumstances that would frighten many people, in this particular situation he experienced an overwhelming and generalized panic. He felt as if the unyielding airline representatives were like Nazis and that the underground passages of the airline terminal resembled a concentration camp. The helplessness of not being able to return home, combined with the institutional intransigence of the authorities, evoked the following memory, which had been unconscious.

When this man was three years old, he and his parents were residents of a central European country and, as Jews, were desperately attempting to escape from the Nazis. They did in fact manage to obtain an airline passage to freedom, but until that point, the outcome was very much in doubt. Although my patient did not recall his affective state at that time, his parents reported that he seemed cheerful and unaffected by their anxiety. In this example, his helpless inability to leave a foreign city, combined with the intransigence of the authorities, evoked a specific affect category that remained as a potential memory of an unassimilated past experience. In this example, an unconscious memory was

metaphorically interpreted with the help of a metonymic association. His helpless inability to leave a foreign city combined with the intransigence of the authorities served as a metonymic trigger. It would appear that the affective gestalt consisting of his helpless inability to leave plus the intransigence of the authorities was a metaphoric categorical equivalent of the earlier trauma. This metaphorical correspondence triggered a global response in which the differences between the domains of past and present were obliterated and, accordingly, he became intensely frightened. In this example, I believe that an unconscious metaphoric process interpreted a salient emotional unconscious memory, which was then transferred onto present experience. *The traumatic memory of his childhood remained intact, as it had not been recontextualized as a result of later experience.*

Here is a further example. 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 emotionally attached to them, but any sign of irrational thinking on the part of a woman upon whom he was dependent, such as his wife, made him extremely anxious. The metaphoric process created an unconscious affect category—that of irrationality in women upon whom he was dependent. This affective memory was activated and recreated in real time by means of a metonymic association. When he was responding to his wife’s “irrational” behavior, the distinction between past and present was obliterated, as in the previous example. The past invaded the present.

If we return to the definition of metaphor as the transfer of meaning between dissimilar domains, the domains here are that of past and present time. An unconscious metaphoric process resulted in the transfer of meaning between the here and now and the memorialized past. Unlike the examples of mathematical imagination that I presented earlier in this chapter, where metaphor led to new combinations of thought, in these cases of trauma, the metaphoric process resulted in the transfer of meaning from the past to the present, but without such transformations. *It can be said that the metaphoric process was foreclosed or frozen.*

The body image suffers a similar fate when there is an absence of perceptual inputs, leading to a failure of recontextualization. This is evident in phantom-limb phenomenon, where there is a failure to update the image of the body due to the absence of sensory inputs from the missing limb (Ramachandran and Blakeslee 1998). The neurologist Ramachandran devised an ingenious method for treating phantom limbs. He restored the absent sensory inputs through an arrangement of mirrors in which an image of the patient's intact limb was substituted for the one that was lost. In some cases the illusion of the phantom limb disappeared because of a recontextualization of the body image.

In *Other Times, Other Realities* (Modell 1990), I referred to the concept of *affect categories*. I was attempting to find a new way of understanding the old psychoanalytic notion of "complexes." A "complex" can be defined as an organized group of ideas and memories of great affective force that are either partly or totally unconscious. I believe that metaphor organizes emotional memory. Inasmuch as category formation is an aspect of memory, metaphor provides the link between emotional memory and current perceptions. I have suggested that a similarity based on a metaphoric

correspondence is the means through which emotional categories are formed. Unconscious emotional memories exist as *potential* categories, which, in the process of retrieval, are associatively linked to events in the here and now by means of metaphor and metonymy. As consciousness is at all times primarily a *selecting agency* (James 1890), metaphor and metonymy play a salient role.

The Varieties of Conscious and Unconscious Memory Systems

Although there may be innumerable different memory systems in the brain, many cognitive scientists have followed the lead of the psychologist Endel Tulving (1972), who differentiated experiential memory, which he called *episodic*, from what he termed *semantic* memory. *Episodic memory is temporally dated, whereas semantic memory is not.* Semantic memory refers to knowledge-based memory, the memory of acquired information not in any sense autobiographical.

Another well-known category of memory is that of *procedural* memory, the memory of motor routines, such as learning to ride a bicycle or learning to play the piano. Unlike episodic memory, which can potentially become conscious, implicit procedural memory is incapable of becoming conscious. That is to say, we cannot consciously recall (without performing the action) the sequence of motor acts required to ride a bicycle or tie our shoelaces. Procedural memory is without meaning and has no relation to metaphor.

Some cognitive scientists and neurobiologists mistakenly believe that implicit or procedural memory is the only form of unconscious memory, I would judge this opinion to be a profound misunderstanding. This is a significant point of disagreement between psychoanalysis and neuroscience re-

garding the nature of the unconscious. Psychoanalysts believe unquestionably that the unconscious is a source of potential meaning—that the unconscious does not consist only of the memory of motor routines. What Tulving calls *episodic* (autobiographical) memory is also unconscious, especially the memory of unassimilated experiences. Unlike procedural memory, episodic memory, the memory of the history of the self, is always potentially meaningful.

To limit the unconscious to the memory of motor routines is totally at odds with the hypothesis of an unconscious metaphoric process that assumes unconscious memory to be *potentially* meaningful. As we shall see, this is a very important issue, for it is based on certain philosophical assumptions concerning the definition of mind. (I discuss this issue further in chapter 11.) There are many in the cognitive-science community who would limit the definition of mind to conscious experience and who believe that only procedural memory is implicit or unconscious. As procedural memory is devoid of semantic content, this view of human psychology is reminiscent of a discredited behaviorism that achieved a certain clarity by eliminating the mind.

What follows is Tulving's description of the distinction between episodic and semantic memory:

Episodic memory receives and stores information about temporally dated episodes or events, and temporal-spatial relations among these events. A perceptual event can be stored in the episodic system solely in terms of its perceptible properties or attributes, and it is always stored in terms of its autobiographical references to the already existing contents of the episodic memory store.

Semantic memory is the memory necessary for the use of language. It is a mental thesaurus of organized knowledge a person possesses about words and other verbal symbols, their meaning and referents, about relations among them, and about roles,

formulas and algorithms for the manipulation of the symbols, concepts and relations. Semantic memory does not register perceptual properties of inputs, but rather cognitive referents to input signals. The semantic system permits the retrieval of information that was not directly stored in it, and retrieval of information leaves its contents unchanged. (1972, p. 385)

Tulving's statement that retrieval from the semantic (knowledge-based) memory systems leaves its contents unchanged, that semantic memory is not recontextualized, is an important characteristic that differentiates semantic from episodic (autobiographical) memory. Episodic memory is the memory of the self, and apart from trauma, the memory of the self is continually updated.

Neuroscientists have obtained evidence of neural correlates that confirm Tulving's categories of episodic and semantic memory. Children who sustained bilateral damage to their hippocampus developed amnesia for autobiographical (episodic) memory, while preserving the memory of acquired knowledge (semantic memory) (Vargha-Khadem, Gadian, et al. 1997). These researchers infer from their investigation that semantic memory is preserved when the underlying cerebral cortices are intact. This work also reinforces the belief that the hippocampus processes experiential (episodic) memory (Pally 1997). Tulving's distinction between episodic and semantic memory is also confirmed by laboratory experiments, as detailed by Daniel Schacter (1996).

The Recall and Influence of Early Memories

The hippocampus, responsible for declarative memory, is a structure that is slow to mature, so affective memories from infancy and early childhood may be retained in the uncon-

scious but cannot be remembered (LeDoux 1996). We know that infantile amnesia persists until about the age of two and a half. But infant researchers can demonstrate that infants remember affective interactions with their caretaker (Beebe, Lachman, et al. 1997). These memories, however, remain implicit; they are what Christopher Bollas (1987) has termed *the unthought known*.

Infant researchers such as Daniel Stern (1994) suggest that infants have a memorial schema consisting of a gestalt of their cognitive and affective interaction with their caretakers, which he calls a "schema of being with." This affective schema is organized along a temporal dimension that can be likened to a narrative. Stern described the interaction as a narrative envelope (I will return to this narrative envelope in chapter 9). The fact that these early memories cannot be made explicit does not mean that they are under repression. It seems likely, therefore, that such early affective memories may be stored as wordless affective metaphors. The amnesia of early childhood thus represents a problem of retrieval of memory rather than registration of memory.

The long-range effect of the unconscious memories of salient interactions between children and their caretakers can be inferred from the so called "dead-mother syndrome" (Green 1986, Modell 1999). Observations from adult psychoanalysis suggest that there are, in some instances, lasting psychological consequences that follow from a child's relationship with a mother who is physically present but emotionally unresponsive. The mother's unresponsiveness is frequently due to the fact that she is significantly depressed. Daniel Stern (1994) described the infant's responses to its depressed mother. He observed the infant's "micro-depression," resulting from its failed attempts to bring a depressed mother back to emotional life. "Compared to the

infant's expectations and wishes, the depressed mother's face is flat and expressionless. She breaks eye contact and does not seek to reestablish it. There is less contingent responsiveness."

One has to be cautious in suggesting any invariant or causal connection between maternal care in childhood and later adult psychopathology,⁶ as every individual's response to trauma is unique and in health memory is recontextualized. For these reasons, it is difficult to demonstrate with any certainty that there are causal links between patterns of the child's early interaction with its caretakers and later disturbances. Nevertheless, most psychoanalysts believe that the child's interactions with its caretakers are recorded *as potential unconscious memories* that will, in some instances, continue to exert an organizing influence upon adult relationships. I (Modell 1999) and other psychoanalysts have observed that *some* individuals whose mothers were depressed and emotionally unresponsive when they were children are especially vulnerable as adults to states of withdrawal and unrelatedness in those they love. Therefore, it is not unreasonable to assume that patterns of interaction between a young child and its caretakers are unconsciously memorialized and that in some instances such memories can be reevoked and transferred onto present relationships even when the original memories cannot be retrieved.

Comparing the Freudian and Cognitive Unconscious: An Afterthought

As the psychologist Nicholas Humphrey (1997) noted, until Freud the idea of an unconscious mind had been considered a conceptual impossibility. Today Freud's assertion *that mental processes are in themselves unconscious* has been redis-

covered by some neuroscientists. For example, Francis Crick and Christof Koch (2000) accept Freud's dictum that thinking is largely unconscious.

Cognitive science now recognizes that consciousness is, as Freud perceived, merely the surface of a mental iceberg in that most cognitive processes, such as procedural memory, are unconscious. It is evident that the Freudian dynamic unconscious and the newly recognized cognitive unconscious represent quite different landscapes. But, I suggest, these landscapes are not entirely incompatible. The Freudian unconscious is implicitly conflictual and dynamic because of the central position given to the fact that repression controls access to consciousness. In the next chapter I will critically examine Freud's concept of repression, which I believe to be a weak link in Freudian theory. But even if we put the concept of repression aside as an explanation, there is unquestionably an involuntary and unconscious selective process that controls access to consciousness. In the Freudian unconscious, conflict is an implicit determinant in deciding what remains unconscious. Freud also believed in a cognitive unconscious, in that he recognized *potential meaning* to be present in unconscious memory. But more important, Freud believed that the unconscious was that part of the mind where man's instinctual endowment made somatic demands upon the self (1940, p. 148). These somatic demands may remain unconscious or be elaborated as conscious images, fantasies, and focused desires.

This aspect of the unconscious is conspicuously absent from recent descriptions of the cognitive unconscious, such as provided by Lakoff and Johnson. They state, "Since cognitive operations are largely unconscious, the term *cognitive unconscious* accurately describes all unconscious mental operations concerned with conceptual systems, meaning and

language" (Lakoff and Johnson 1999, p. 12). They characterize the cognitive unconscious as follows: "The cognitive unconscious is thoroughly efficacious: intentional, representational, propositional, truth characterizing, inference generating, imaginative and causal" (1999, p. 117). The unconscious emotions that dominate the Freudian unconscious are conspicuously absent in this description.

To a psychoanalyst, this is a rather bland, arid, and one-dimensional view of the unconscious mind as compared to the Freudian unconscious. The cognitive unconscious must include an *emotional unconscious*, encompassing not only the "somatic demands upon the mind" but also the potential expression of unconscious emotional memory and unconscious fantasy.