

Imagination and the Meaningful Brain



Arnold H. Modell

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For Lora

What is most human is not rationalism but the uncontrolled and uncontrollable continuous surge of creative radical imagination in and through the flux of representation, affects and desires.

Cornelius Castoriadis

Contents

Preface	xi
Acknowledgments	xv
1 Uncertain Steps toward a Biology of Meaning	1
2 Metaphor, Memory, and Unconscious Imagination	25
3 Imagination's Autonomy	49
4 The Corporeal Imagination	69
5 Intentionality and the Self	91
6 Directing the Imagination	111
7 The Uniqueness of Human Feelings	131
8 Feelings and Value	151
9 Imagining Other Minds	171

10 Mirror Neurons, Gestures, and the Origins of Metaphor	183
11 Experience and the Mind-Body Problem	193
Notes	205
References	217
Index	235

Preface

The basic premise that informs this book is that *human experience cannot be omitted from a scientific explanation of how the mind/brain works*. The intrapsychic complexities of human psychology, as observed through introspection and the empathic knowledge of other minds, must be added to the third-person perspective of cognitive psychology and neuroscience. As a psychoanalyst, this is what I have attempted to do.

My interest in neuroscience was stimulated by a completely fortuitous encounter with Gerald Edelman's book *Neural Darwinism*, which described his theory of neuronal group selection. I was attracted to his selectionist viewpoint and his global theory of the mind/brain, which seamlessly moved between neural and mental concepts. More specifically, I was excited to discover that Edelman's view of memory as a recategorization is very similar to a theory of memory that Freud had proposed in 1896 and unfortunately later ignored. I subsequently made use of Edelman's selectionist theory of memory in my book *Other Times, Other Realities* (1990). There I understood the familiar repetition compulsion to be a failed attempt to recategorize the

affective memory of traumatic experiences. In my book *The Private Self* (1993), I became interested in the problem of the biology of meaning when I recognized that the unconscious mind can be nothing other than a neurophysiological process, but that meaning is in some unknown fashion potentially present as a latent property.

How meaning exists in the unconscious mind as a potential property became clearer to me as a result of the contributions of the linguist George Lakoff and the philosopher Mark Johnson. I owe to them the crucial observation that metaphor is primarily a form of cognition rather than a trope or figure of speech. Further, metaphor as a cognitive tool can operate unconsciously, so that a metaphoric process is one aspect of the unconscious mind. Lakoff and Johnson also emphasized, as I shall do in this book (chapter 4), that metaphor finds its source originally in the body, and that the body, to paraphrase Merleau-Ponty, is an “experiential structure.” If we combine Edelman’s selectionist principle with Lakoff and Johnson’s unconscious metaphoric process, metaphor becomes the selective interpreter of corporeal experience.

Another organizing principle of this book is the assumption that different domains of the mind/brain operate in accordance with different “rules.” The algorithmic certainty, point-to-point mappings, and invariance that characterize the “computations” of the visual cortex cannot be applied to the brain’s construction of meaning. I join with many other critics who have also observed that algorithms cannot account for thinking in images or fantasy, for error and novelty, or for the fact that the mind can imaginatively bootstrap itself from within. The construction of meaning is not the same as the processing of information; meaning cannot be “represented” by a formal symbolic code. Therefore,

I question the neo-Cartesian concept of representation that has become a basic assumption for many in the cognitive-science community (chapter 1). As a viable alternative to the idea of representation, I turn to Gerald Edelman's and Jean-Pierre Changeux's selectionist theories and the nonlinear dynamics implicit in Walter Freeman's concept of unconscious intentionality.

The construction of meaning requires the use of emotions and feelings as markers of value (chapter 8). Inasmuch as the limbic system, the emotional brain, is of ancient origin, there are homologies between emotions in humans and other species. Therefore, a consideration of evolutionary continuities and discontinuities is an ever-present subtext throughout this book. Unlike other primates, we can delay the expression of emotion, but we, like other primates, are also subject to uncontrollable rages. The amygdala may be the structure that mediates fear in all mammals, including ourselves, but the interpretation of this emotion is another matter. What is singularly human is not only our possession of language but also our capacity for generative imagination, which in turn relies upon the use of metaphor as a cognitive tool. By means of metaphor, feelings can be imaginatively interpreted, displaced, and transformed. Feelings can be "sublimated," which is an exclusively human facility (chapter 7).

The question of evolutionary continuities and discontinuities also appears in the relationship between consciousness, feelings, and the self (chapter 5). I assume, as have others, that mammals are conscious and are conscious of their feelings. Consciousness of feelings may constitute a "protoself" or a "biological self" that functions as a monitor of homeostasis and a consciousness of somatic boundaries so that self and nonself can be distinguished. But very few species other

than ourselves have a capacity for recognizing oneself in a mirror. Whether we alone as a species have the capacity for self-reflection, which differs from self-recognition, is a controversial and unsettled issue. I will also examine the question of whether higher primates, such as chimpanzees, possess a theory of mind that can attribute a complex intentionality to others (chapter 9).

In chapter 10, I explore the implications of “mirror neurons” and present several speculative theories regarding the coevolution of metaphor and language. In the closing chapter (chapter 11), I examine the significance of experience in relation to the philosophical mind/body problem. The experience of consciousness should be distinguished from the functions of consciousness. If one accepts this distinction, one must also accept that an epistemic pluralism is needed if we are to achieve a better understanding of the functions of the brain.

Acknowledgments

As this book represents a blend of several disciplines, including some in which I am far from expert, I have needed to rely on the judgments of others to avoid significant errors. It is a pleasure to acknowledge the following friends and colleagues who have read and criticized the manuscript in its entirety or in part. My thanks and gratitude are extended to Gerald Edelman, Walter Freeman, Toni Greatrex, John Kerr, Lewis Kirschner, Jaak Panksepp, David Pincus, Dominique Scarfone, Irving Singer, and my wife Lora Tessman. Any residual misunderstandings are, of course, my own.

Imagination and the Meaningful Brain

1

Uncertain Steps toward a Biology of Meaning

Metaphor is the great human revolution, at least on a par with the invention of the wheel. . . . Metaphor is a weapon in the hand-to-hand struggle with reality.

Yehuda Amichai

The ultimate goal of neurobiology is to discover how the mind works. When meaning is constructed, a transformation takes place in the brain that is experienced by the mind. A crucial problem for neuroscience is to explain how “matter becomes imagination.”¹ The development of a biology of meaning is therefore intrinsically multidisciplined and requires, as I shall try demonstrate throughout this book, an epistemic pluralism.

The investigation of meaning requires an interdisciplinary effort that includes the philosophy of language, linguistics, cognitive science, neurobiology, and psychoanalysis. All of these studies differ in their observational methods, and every specialist, like the proverbial blind men and the elephant, approach the problem from their own perspective. I will claim that the third-person perspective of neuroscience, in its attempt to find the neural correlates of

psychological processes, needs also to be augmented by the phenomenology of introspection and the intersubjective knowledge of a two-person relationship. This is especially important with regard to the investigation of imagination, emotion, and feeling. But attempts to explain the meaning of experience has been, for millennia, within the domain of philosophy, and philosophers have shaped the way psychologists have thought about this problem.

Jerome Bruner (1990) describes how in the 1950s he and his colleagues attempted to establish meaning as *the* central concept in psychology. They attempted to restore the concept of meaning to a behavioral psychology and to a psychoanalysis under the sway of a mechanistic instinct theory. Bruner notes that with the advent of the computational theory of mind, information theory has replaced a concept of meaning. Bruner makes the cogent point that the *construction* of meaning is very different from the *processing* of information.

With a few important exceptions, for nearly 2,500 years the problem of meaning, when considered by philosophers, has been separated from the brain, from the body, and from human nature.² Traditionally, philosophy has debated the problem of meaning in the context of language: how is it possible that words and sentences “correspond” to things in the physical world? The problem of meaning was seen as a problem of reference: How can something in one domain, that of the mind, refer or “correspond” to something else in another domain, that of the world? How do words and sentences “represent” things in the external world? Within philosophy, an examination of meaning was invariably linked to the question of truth. What guarantees a truthful “correspondence” between words, thoughts, and

objects? There is a further problem: How is it conceivable that meaning is at the same time both conventional and private? How can the same word mean the same thing to different people if, as Humpty Dumpty said, “When I use a word, it means just what I choose it to mean neither more nor less.”

Turner (1992) has suggested that philosophy ignored the view of the fifth-century Attic philosopher Protagoras, who proposed that man is the measure of all things. Protagoras, as Hilary Putnam notes (1990), was the first deconstructionist. He appears as an off-stage character in Plato’s *Theaetetus* (1928, p. 494). Socrates attacks his idea that man is the measure of all things, as it leads to an unsupportable relativism (1928, p. 494). Socrates says, “The same wind is blowing, and yet one of us may be cold and the other not.” Wind cannot be defined by subjective experience. Socrates argued that to believe in the subjectivity of knowledge would introduce a relativism so encompassing that one would not be able to agree on the shared and public meaning of words. Therefore, disagreement and agreement between individuals would not be possible.

The enigma of the meaning of meaning has puzzled philosophers for thousands of years. While it may seem perfectly commonsensical that there is a connection between meaning and mind, that the creation of meaning is a process occurring within one’s mind/brain and with other minds, this was not the focus of understanding of traditional philosophy and what has been described as “first generation” cognitive science (Lakoff and Johnson 1999). Traditional philosophy and an earlier generation of cognitive scientists have assumed what has come to be called an “objectivist,” or disembodied view—that human nature and the

mind/brain play no role in the establishment of meaning. Surprisingly, meaning was believed, until recently, to be generated by a formal symbolic process that was independent of minds and bodies.³ Can one still believe that meaning is disembodied if one hears Robert Graves define a “true poem” as one in which “the hairs stand on end, the eyes water, the throat is constricted, the skin crawls and a shiver runs down the spine” (1948, p. 24)? Hilary Putnam affirms that meaning is not created through the translation of a cryptographer’s code but that meaning is *interactive* and “it depends not just on what is in our heads but also on what is in our environment” (1988). Putnam is essentially describing an ecological theory of mind: meaning is embodied in a mind, which in turn is conjoined to the environment.

A Tendency to Dehumanize the Mind

Today, when the investigation of consciousness and meaning has become a legitimate goal of neuroscience, there has occurred, ironically, within the past decades, a counter-movement in psychiatry that has resulted in the dehumanization of the mind. The meaning of human experience is no longer viewed as significant. In 1948, when I started training as a resident in psychiatry, psychiatry’s appeal as a profession was that it combined both science and humanism. Fifty years ago, one attempted to understand the patient’s narrative and inner life and yet at the same time relate that knowledge to some kind of coherent scientific theory. At the beginning of the twenty-first century, psychiatry in the United States remains in the grip of a pharmacological scientism, a world of neuromodulators. Psychiatry has lost interest in the patient’s inner life—the inner meaning of mental disorders is considered to be irrelevant to their treat-

ment and etiology. Consequently, psychiatry has become nearly mindless. Today I feel alienated from psychiatry and hardly recognize it as the same discipline that I once embraced.

This flight away from a meaningful mind is widespread and not confined to psychiatry. This tendency may represent an aspect of American culture that is relatively intolerant of conflict and the disorder that is part of one's inner world, and that welcomes the orderliness of "objective" and presumably scientific explanations of how the mind works. These same cultural forces are one among many elements that contributed to the depreciation of Freud and psychoanalysis in the United States, in contrast to Europe. I agree with Jonathan Lear (1998) that Freud is only a stalking horse, that the culture war is really about the nature of the human soul, the depth and complexity of mind, and the fact that motivation and meaning are derived from the unconscious mind, of which we are only partially aware and which we cannot control.

In a *New Yorker* interview (May 8, 2000) the novelist Philip Roth said, "In the first half of the twentieth century the whole intellectual and artistic effort was to see *behind* things, and that is no longer of interest. To explore consciousness was the great mission of the first half of the century—whether we're talking about Freud or Joyce, whether we're talking about Surrealists or Kafka or Marx or Frazer or Proust or whatever. The whole effort was to expand our sense of what consciousness is and what lies behind it. It's no longer of interest. I think what we're seeing is the narrowing of consciousness. I read the other day in a newspaper that Freud was a kind of charlatan or something worse. This great, tragic poet, our Sophocles!"

Stephen Toulmin (1990), a historian of science and philosophy, believes that the philosopher's "quest for certainty" is a sign of social disorder. He believes that Descartes' attempt to mathematize the human mind, which I shall shortly discuss, was a consequence of the terrible social upheavals that followed from the Thirty Years War, fought between Catholics and Protestants. Descartes' quest for pure reason can be interpreted as a refuge from the destructive effects of passionate controversy. Toulmin reasoned that in times of great social disruption one finds comfort in a philosophy that is formal, timeless, and unchanging. He contrasted Descartes' "quest for certainty" with the intellectual culture of the late Renaissance, exemplified by writers such as Montaigne, who accepted pluralism and uncertainty. If Toulmin's hypothesis is correct, the contemporary effort among some cognitive scientists to find symbolic logic or linear algorithms in the mind / brain may be an unconscious response to the madness that has characterized the terrible twentieth century.

Descartes needed to believe that the mind could in fact be disengaged from emotion, that the mind, when occupied with clear and distinct ideas, existed in an ontologically separate realm from that of the body and its passions. It is seductive and comforting to believe in pure reason uncontaminated by emotion, for it promises the illusion of being in absolute control of the mind and its thoughts. Despite the fact that Freud irreversibly changed this view of human nature, the study of emotion has remained the stepchild of neuroscience. Freud attributed this resistance to accepting the influence of unconscious motivation to seeing it as a threat to man's narcissism—that the ego is not even master in his own house. The discovery of the unconscious, was

the third of similar threats to our narcissism and megalomania, the former two being the Copernican and Darwinian revolutions.

This craving for objectivity, according to Putnam (1990), can be found in the belief that perfection can be realized in measurement and what cannot be quantifiable is neither scientific nor objective. Putnam's use of the term *craving* is apt in that the quest for certainty can have the force of an addiction. For decades, under the influence of behaviorism, many psychologists viewed the mind as an unknowable "black box." Today there has been a 180 degree turn, and for some investigators the opposite is true: the mind can be mathematized and known with certainty (Werbos 1993). What may be at issue here is the linear mathematical formalism associated with a computational metaphor. As Arturo Rosenbluth and Norbert Wiener observed, "The price of metaphor is eternal vigilance."⁴

The Australian philosopher Tim van Gelder (1998, p. 427) has provided an elegant argument for substituting a dynamic-systems hypothesis for the prevailing computational analogy. I suspect that neuroscience is at the beginning of a paradigm shift that will gradually recognize a very different model derived from nonlinear dynamics that incorporates indeterminism and uncertainty (for example, see Freeman 1999a, 1999b, and for a discussion of the formalism of nonlinear dynamics, see Kelso 1999).

Some who embrace a computational theory of mind do so with a religious intensity. The philosopher John Searle (1997) noted this when he challenged the belief that a computer's artificial intelligence could serve as an analogy of the mind.⁵ Searle (1997) reported that the response to his criticism from adherents to a computational theory of mind

has been as passionate and of such religious intensity as if he had attacked the idea of a soul.

It is important to recognize that these contemporary controversies have their eighteenth-century antecedents. This can be illustrated in the views of two philosophers: Descartes and Vico. Descartes' influence on cognitive science has been enormous. The computational view of mind can be traced to Descartes' intent to mathematize the human soul.⁶ On the other hand, Vico, whose intuition anticipates many of the ideas that I will present in this book, is known only to the specialist. I would much prefer that their influence were reversed.

With the famous exception of Eccles (1993), there are practically no neurobiologists who believe in a Cartesian dualism—the separation of matter from mind.⁷ However, vestiges of Descartes' hope to express mental process in the language of mathematics can be noted by the persistence in the use of the term “compute” as a description of the mind/brain. While the metaphor of the mind/brain as a computer has nearly disappeared, the linear determinism implicit in a “computational” metaphor still persists. For example, Stephen Pinker describes the computational theory of mind as “one of the great ideas in intellectual history” (1997). Although he rejects the analogy of mind as computer, he characterizes psychology as “the analysis of mental software.”

It is estimated that the human brain has 100 billion neurons and each neuron may have 10,000 synapses (Changeux and Connes 1995). This literally astronomical potential for synaptic connections in a human brain cannot be duplicated by computers; the scale of a computer-generated model of the brain is similar to that of an insect- or worm-sized brain. But even a worm-sized brain, such as *C. elegans* with its 302 neurons, is extremely complex (Koch and Laurent 1999).

However, I would not at all question the usefulness of computer-generated models of the mind or the use of mathematical models to describe functional brain states, such as suggested by Kelso (1999; see also Tononi and Edelman 1998).

It has been presumed by many in the cognitive-science community that the brain has precise circuits that store signals in a more or less orderly and coded fashion. The assumption is that there is a cerebral code that corresponds to the information received from the external world and from within the brain itself. The accepted view is that coding occurs through variations in synaptic amplitude. The supposition here is that the world is the source of information in the form of coded signals, which is then correspondingly “represented” in the mind. Information theory is incompatible with our uniquely human imaginative capacities, which enable the mind/brain to bootstrap itself from within. The brain could be said to create its own information, but that is not how this metaphor is usually applied. The psychologist Sir Frederick Bartlett, in his classic monograph *Remembering*, made special note “of the organism’s capacity to turn around upon its own schemata and construct them afresh” (1932, p. 213). If the mind turns around upon its own schemata, it does not mirror the outside world. Again, we must underline the observation that the *construction* of meaning is very different from the *processing* of information. Walter Freeman’s *Societies of Brains* (1995) and his *How Brains Make Up Their Minds* (1999b), Gerald Edelman’s trilogy describing his theory of neuronal group selection (1987, 1989, 1992), and Fred Keijzer’s *Representation and Behavior* (2001, p. 409) can all be read as a refutation of information theory and coded representations.⁸

Creating artificial neural nets with weighted nodal points, also known as parallel distributed processing, or connectionism, is a closer analogy to neural functioning, as compared to the manipulation of symbols, but at best it is but a very crude analogy. Even animals with very simple nervous systems do not evidence constant weights at synaptic junctions (Koch and Laurent 1999).⁹ Conceptual models of the brain/mind are in the nature of thought experiments. Whether such models reflect how the brain actually works remains an open question.

The idea of linear algorithms as a functional unit of the mind/brain has been criticized from many diverse points of view—by neurobiologists such as Gerald Edelman (1992)¹⁰ and Walter Freeman¹¹ (1995, p. 125; 1999a, 1999b), by the philosopher John Searle (1997), and by the mathematician Roger Penrose (1989), who notes that algorithms do not correspond to how mathematicians think. Some linguists also oppose a computational theory of mind; they include George Lakoff¹² and Gilles Fauconnier (1994). A deep and profound objection to the algorithmic model of the brain can be found in the viewpoint of the Nobel prize-winning chemist Ilya Prigogine (1997), who believes that the universe, which includes our bodies and brains, is not deterministic but probabilistic.

All of these critics have noted that algorithms cannot account for thinking in images, for fantasy and imaginary thoughts, for error, or for novelty. How can the logic of the algorithm be applied to dreams and fantasies? Implicit in the view that the algorithm is the functional unit of the mind/brain is the hope for an eventual reductionism, which philosophers describe as “identity theory,” a presumed identity between material events and psychological events. (I will discuss this further in chapter 11.)

Descartes and Vico: Two Antithetical Views of the Mind

As I noted, the hope that mind can be mathematized can be traced to Descartes. This is also true regarding the concept of *representation*, which is central to cognitive science. The Cartesian concept of a representation in the mind that corresponds to objects in the world is also an implicit component of information theory.¹³ For this reason, it is worthwhile to review Descartes' ideas in greater detail. Descartes, who systematized analytic geometry, intended to apply a similar geometric precision to the mind by introducing the doctrine of "clear and distinct ideas," which are potentially quantifiable and organized in accord with a formal logic. If one accepts the fact that the mind contains clear and distinct ideas, those ideas could be subject to the formal logic of geometry (Gaukroger 1995). In Isaiah Berlin's words, "These ultimate *atomic entities of thought* were conceived as being connected with one another by 'necessary' logical links [which can be] mathematically described" (1976). Although Descartes separated mind from the natural world, he believed that the same formal logic by means of which science has obtained control and understanding of the physical world could be applied to the mind, provided one accepts his original premise that thoughts are clear and distinct ideas. To preserve clear and distinct ideas, Descartes needed to separate the corporeal passions from the mind / soul, which is immaterial and without extension. Descartes' idea of atomic entities connected by logical links still pervades the thought of some researchers in contemporary cognitive science, especially those who believe that meaning can be equated to a formal symbolic logic, a "mental code." For example, this aspect of Cartesian thought has reappeared as "mentalese," a term introduced by the philoso-

pher and former colleague of Chomsky, Jerry Fodor (1983). Fodor at one time believed that there is a mental code that corresponds to and mirrors reality.¹⁴ Chomsky's theory of syntax, a theory of formal rules of interpretation, has reinforced this neo-Cartesianism. Implicit in this is a further assumption—that language and thought can be conflated. This view of the mind has been extensively attacked by Hilary Putnam (1988), Gerald Edelman (1992, p. 43), and Lakoff and Johnson (1999).

Until the recent demise of logical positivism, traditional philosophers also believed that meaning could be defined by means of formal logic and therefore objectified. Belief in the objectivity of meaning required that one accept the concepts of *correspondence* and *representation* to account for the constant and truthful relation between what is represented in the mind and what exists in the physical world. Descartes' answer to the question of what guarantees the constancy of a connection between thoughts, words, and things is the existence of a benevolent God who would not play tricks on his subjects. That a *representation* in the mind, such as an idea of an object, matched the object itself assumed God's benevolence. Objective reality was a property of an omnipotent and infinite God. As God is the creator of all things, man's finite, subjective knowledge is a representation of God's view, and therefore a *correspondence* exists between man's subjective, finite knowledge and objective reality. This, Descartes believed, was one proof of God's existence. The flavor of Descartes' conception of *representation* and *correspondence* can be obtained from the following quotation. Descartes stated,

I understand a supreme God, eternal, infinite, omnipotent, the Creator of all things which are outside of Himself, has certainly more

objective reality in itself than those by which finite substances are represented. . . . [To say that] external things exist subjectively and formally in themselves, but objectively or ideally in the understanding, means (as is evident) merely that an idea should agree with the thing of which it is the idea; and that it *hence contains nothing of a representative nature which is not really in the thing itself*, and represents more reality in proportion as the thing it represents contains more reality in itself. (1641, vol. 2, p. 157; my emphasis)

This Cartesian concept of the correspondence of ideas in the mind to objects in the world has been discarded by a contemporary philosophy that no longer believes in a correspondence theory of truth. But the notion of mental representation is still very much with us. The term *representation* is sometimes used in a very broad sense to denote *all mental processes* (the world “represented” in the mind). But when the term is used to refer to a *specific* content that is “represented” in the mind, there may be a naive assumption that the representation (in the mind) correspondingly mirrors what exists in the world. There is, as I have noted earlier, a growing literature within neurobiology and cognitive science that refutes the concept of representation, and I would venture that the lifespan of the concept of representation is limited. The mind/brain does not represent or mirror reality; it *constructs* a virtual reality of its own. Rodolfo Llinás in *I of the Vortex* observes that the brain is a “reality emulator, that we are basically dreaming machines that construct virtual models of the real world” (2001). A representation theory of mind cannot be reconciled to the instability of perceptual illusions or to the fact that the object constructed in the mind does not correspond to the physical object in the world (see, for example, Crick 1994). The concept of representation cannot explain Ramachandran’s observations of phantom limbs, where patients construct experiences that

do not exist in the physical world (Ramachandran and Blakeslee 1998).¹⁵ In chapter 10, I will discuss the possibility that “mirror neurons” may offer an alternative neural explanation that may eventually substitute for the essentially misleading philosophical concept of representation.

Vico’s Poetic Logic and the Embodiment of Mind

The need for an epistemological pluralism that I noted earlier was first advanced by the Italian philosopher Giambattista Vico (1668–1744). He initially recognized the distinction between self-knowledge and knowledge of social institutions of which we are the authors, on the one hand, and knowledge of the natural world that exists outside of our minds and that would remain even if we did not exist, on the other. This is the distinction that Dilthey, a century later, characterized as human studies, (*Geisteswissenschaft*) versus natural science (*Naturwissenschaft*). Empathic knowledge of the self and the other and third-person observations will remain different ways of knowing, but the establishment of a biology of *meaning* will, I hope, include first-, second-, and third-person perspectives.¹⁶ So a biology of meaning may eventually straddle this epistemological divide.

Giambattista Vico was born in 1668, 72 years after Descartes. Although he is today thought to be Italy’s most famous philosopher, his influence has been nearly completely overshadowed by Descartes. The reasons for Vico’s relative obscurity are many. His style, unlike Descartes’, was undisciplined. Further, he was not a clear or coherent thinker. Isaiah Berlin observed, “Vico has not enough talent for his genius.” Consequently, his fate has been to be repeatedly forgotten and rediscovered.

What Descartes would completely deny and what Vico was the first to discover is that *meaning is embodied in our total affective interest in the world* (Edie 1969). (*Affective interest* is a concept similar to Freud's concept of cathexis, as I shall describe in chapter 8.) Vico further stated, "*Meaning is constructed through imaginatively entering into the minds of others.*" Vico did not share Descartes' quest for certainty but, in a more pluralistic tradition, accepted what was only probable. Further, Vico proposed what we would now describe as an evolutionary concept of mind. In 1744, when Vico's *New Science* was published, biology was not yet recognized as a separate discipline, and Darwinian evolution was more than a century in the future. Vico proposed that in the course of cultural evolution, the human mind *evolved linguistically*, which resulted in historically different stages of consciousness and different constructions of reality. Vico anticipated a similar hypothesis introduced by the psychologist Merlin Donald (1991) and the archeologist Steven Mithin (1996). It seems to me probable that in human evolution the acquisition of a cognitive capacity for metaphoric thought occurred before the acquisition of language and that the capacity to use conceptual metaphor and the acquisition of language evolved separately. (The evolution of metaphor and language will be discussed in chapter 10.)

Vico wrote that initially humans were without language and communicated by means of signs and gestures. Metaphor was then the primary mode of knowing and understanding the world. With the acquisition of metaphor, the world was interpreted animistically, thunder was a god, and reality was structured in accordance with myth. Vico said, "Every metaphor is a fable in brief" (1744, p. 129). He described *an animistic world in which the structure of mind was projected outwards as a metaphor derived from bodily experience.*

In fact, metaphor was understood not as a figure of speech, a trope, but as a vital means of understanding the world. (This observation waited to be rediscovered by philosophers and linguists such as Lakoff and Johnson [1999] at the end of the twentieth century.) Ralph Waldo Emerson, who was not acquainted with Vico, said, “The world is emblematic. Parts of speech are metaphors, because the whole of nature is a metaphor of the human mind” (1847, p. 18).

Vico further stated, “It is noteworthy that in all languages the greater part of the expressions relating to inanimate things are formed by *metaphors from the human body and its parts and from the human senses and passions*” (1744, p. 405; my emphasis). Vico knew that metaphor is derived from the body and its affective experiences. This is a theme that I shall develop in chapter 4.

Vico opposed the view of the scholastics and Descartes that human nature is lawful, fixed, static, and unchanging. It is important for us to recognize that his work foreshadowed controversies that are still very much alive today. Although neurobiology has unquestionably demonstrated the plasticity of the human brain, there are those who still argue that human nature has been fixed in its genetic adaptation to a late Pleistocene environment and has therefore remained unchanged for 25,000 years (Tooby and Cosmides 1990). Those who believe in an unchanging human nature also argue for a strong genetic determinism of the mind (Dawkins 1976 and Wilson 1998).

I mentioned that it has been Vico’s fate to be continually forgotten and rediscovered. For example, John Searle, without citing Vico, stated in his monograph *The Mystery of Consciousness* (1997), “The really important distinction is not between the mental and the physical, mind and body, but between those real features of the world that exist indepen-

dently of observers—such as force, mass and gravitational attraction—and those features that are dependent upon observers—such as money, property, marriage and government.” (This is the heart of Vico’s argument.) All these cultural institutions—such as money, property, marriage, and government—exist only because of the meaning that we attribute to them. Vico would describe such institutions as man’s construction. As such, they can be better known, as products of our mind, than nonhuman nature, which we can only observe from the outside. We no longer believe, as Vico did, that introspective and empathic knowledge is superior to scientific knowledge. Today most cognitive scientists and neurobiologists dismiss such knowledge as merely anecdotal, and yet every scientist who investigates consciousness makes use of their own introspection. I will reiterate: *when investigating a biology of meaning, we need to accept a pluralistic epistemology that combines a first- and second-person (intersubjective) perspective with the traditional third-person perspective of neuroscience.* The need for this epistemic pluralism was also recognized by the philosopher of science Herbert Feigl (1958) and neuroscientists Francisco Varela (1999) and Max Velmans (2000).

In his essay on the mind/brain problem (1958), Feigl argues for a “double” knowledge, referring both to phenomenology and introspection and to neurophysiology. This topic as it relates to the mind-body problem will be discussed further in chapter 11.

Intentionality as a Biological Concept

Meaning is sometimes equated with *intentionality*. The philosophical concept of intentionality is attributed to Franz Brentano (1838–1927), whose lectures Freud attended when

he was a medical student in 1874. Whether Freud was influenced by Brentano is not at all clear (Jones 1953). Intentionality refers to directing the mind toward an object. Brentano believed that what defines mental states is their intentionality, that is to say, that mental states invariably are *about something*. Brentano also included within the concept of intentionality, the mental "inexistence" of an object, so intentionality includes the imagination. This conception invites the recognition that intentionality must also encompass the unconscious mind's relation to the world. However, the term *intentionality* usually refers, in philosophical discourse, to the conscious mind's relation to the world. It is in this sense that, following Brentano, the philosopher John Searle (1983) defines intentionality as "directedness or aboutness," a "mind-to-world direction of fit." Searle concludes, as I too do, that "intentional states are realized in the neurophysiology of the brain."

A first step toward a biology of meaning requires a broadening of the concept of intentionality. If intentionality is to be brought into a biological context, the direction of fit between brain/minds and the world cannot remain at the descriptive level of "aboutness." Aboutness is unidirectional. If the philosopher's definition of intentionality is to be converted into a biological intentionality, we must posit a more complex relationship between the mind/brain and its environment. Such a relationship between the organism in the environment was described by the geneticist Richard Lewontin. He said, "The external forces, what we usually think of as 'environment,' are themselves partly a consequence of the activities of the organism itself as it produces and consumes the conditions of its own existence. Organisms do not find the world in which they develop. They make it" (1991, p. 105). The neurobiologist Walter Freeman

(1995, 1999b) proposed a more truly biological concept of intentionality as an interactive, ecological concept. Freeman proposed that “meanings arise as a brain creates intentional behaviors and *then changes itself* in accordance with the sensory consequences of those behaviors.” To avoid the errors implicit in Descartes’ concept of mental representation, Freeman embraced the idea of intentionality as described by Thomas Aquinas in 1272. Thomas Aquinas defined intentionality as the process by which humans and other animals act in accordance with their own growth and maturation. An “*intent*” is the directing of action toward some future goal that is defined and chosen by the actor. Intentionality, as redefined in this pre-Cartesian manner, is quite different from the term as used by Brentano and other philosophers such as Searle (1983). Intentionality as redefined here is not about “aboutness.” Meaning is achieved through *action* in the world, and in turn, the self is altered by that action. Freeman’s redefinition of intentionality, therefore, also includes the idea of assimilation—the self changes itself as a result of what it has encountered as a consequence of its actions. Aquinas’ definition of intentionality includes the imagination, as intentionality refers to actions at a future time. Although Thomas Aquinas describes intentionality as directing action toward some future goal defined and chosen by the actor, it should also be understood that intentionality is fundamentally an *unconscious* process, that the self is not necessarily a conscious agent. (I will discuss the self and intentionality in greater detail in chapter 5.) Intentionality so redefined also includes the idea of mental construction by means of selection that is based on forming hypotheses and testing the environment, in contrast to a mental construction that is based on the representation of information. This is a point of view that is consistent with the pragmatic

philosophy of William James and John Dewey, as well as the ecological approach to perception proposed by Piaget (1954), James Gibson (1986), and Andy Clark (1997). "Intentionality differs from a 'motive,' which is the reason and explanation of the action, and from a 'desire,' which is the awareness and experience stemming from the intent" (Freeman 1999b). This definition is fully in accord with Vico's understanding that "meaning is embodied in our total affective interest in the world."

The philosopher Merleau-Ponty's formulation of "the intentional arc" (1962), which "projects around about us our past, our future, our human setting," resulting in "maximum grip," is also fully consistent with Aquinas' concept of intentionality. Freeman believes that the intentional arc names *the tight connection between the agent and the world*, that as the agent acquires skills, those skills are "stored," not as representations in the mind, but as *dispositions* to respond to the solicitations of situations in the world. Freeman not only affirms the existence of a biology of meaning but also recognizes that mappings between the mind and the world are intersubjective. Further, Freeman observed in his research on the reaction of rabbits' brains to odors (which will be described in chapter 5) that there was no invariance between the environmental stimuli and the response in the rabbit's brain. The rabbit's brain does not respond to a symbolically coded message; instead, the *individual rabbit uniquely determined the "meaning" of the stimuli*. Freeman concluded that "the bulbar patterns [in the rabbits' brains] were signs of the meaning of the stimuli for the subjects, not of the stimuli as we observers knew them" (1993). Not only was there a failure to observe invariance between the stimulus and the individual rabbit's response, but the response of each individual rabbit was different from the others.

The Mind Turning Around on Itself

The transformation of the philosopher's concept of intentionality into a biological concept is a first step toward a biological theory of meaning. The goal-directed mind/brain takes *action* in the environment and thereby changes itself. For humans, however, and perhaps for some other primates as well, meaning is created not only in interaction with the environment. In humans the imagination can bootstrap intentionality in the absence of immediate sensory inputs. Llinás describes the brain as "primarily a self-activating system whose organization is geared toward the generation of intrinsic images" (2001). Llinás believes that the consciousness of the dream state, when we are cut off from sensory inputs, is a closer analogy to waking consciousness. He emphasizes, as I shall do, that although the mind is activated by sensory inputs, it is also a self-contained system. Freud suggested something similar. He proposed that the unconscious mind/brain is "perceived" as an internal environment, which can become a substitute for the external environment, a second universe. Meaning may be constructed entirely from within. In a profound and somewhat ambiguous passage, Freud wrote the following: "In psychoanalysis there is no choice for us but to assert that mental processes are themselves unconscious and to liken the perception of them by means of consciousness to the perception of the external world by means of the sense-organs" (1915b, p. 171). The psychologist Nicholas Humphrey (1997) interpreted this and the following Freudian citation as evidence that Freud believed that consciousness functioned as an "inner eye," a kind of metasense organ that covered the entire mind.

Fifteen years earlier in *The Interpretation of Dreams* (1900), Freud wrote the following: "The psychical apparatus, which

is turned towards the external world with its sense organs of the perceptual system, is itself the external world in relation to the sense organs of consciousness." Freud is proposing two interconnected ideas that are entirely consistent with contemporary neurobiology: one is the self-evident idea that consciousness receives impressions from both the external world and the body's interior, but what Freud adds is not self-evident—that sensations are received from the unconscious inner world and are elaborated as feelings in a way that is *analogous* to how sensations are received from the external world. By stating that the psychical apparatus is itself the external world in relation to the sense organs of consciousness, Freud intuited that consciousness not only responded to internal somatic sensations, but that its internal monitoring is analogous to perceiving the external world. He was describing both the bodily sources of the experience of the self and more important, *that the inner world of the self is an alternative universe*. One might say that the inner world of the self is a *virtual* universe.

Freud's thinking was influenced, as he acknowledged (1915b, p. 171), by Kant, who taught that our knowledge of the external world is constrained by the structures of the human mind. That the external world "as it is" is essentially unknowable is a realization that has been ever increasingly confirmed by contemporary neurobiology (Solms 1997b). Although we cannot ever know the unconscious "as it is," Freud viewed the unconscious as a *potential* source of meaning. This is a quotation from his paper "The unconscious" (Freud 1915b, p. 167):

We can go further and argue, in support of there being an unconscious psychical state, that at any given moment consciousness includes only a small content, so that the greater part of what we

call conscious knowledge must in any case be for a considerable period of time *in a state of latency* [my emphasis], that is to say, of being psychically unconscious. When all our latent memories are taken into consideration, it becomes totally incomprehensible how the existence of the unconscious can be denied. But here we encounter the objection that these latent recollections can no longer be described a psychical, *but they correspond to residues of somatic processes from which what is psychical can once more arise.*

Freud does not say anything further about those “residues of somatic processes”¹⁷ from which what is psychical emerges, but on my reading of this passage, Freud suggests that there is an unknown neurophysiological process from which meaning is generated. Meaning exists as a *potentiality* in the unconscious. In the next chapter I will present a hypothesis that describes the generation of meaning from an unconscious metaphoric process.

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