MARK JOHNSON

The Meaning of the Body

AESTHETICS OF HUMAN UNDERSTANDING

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4. *Theoretical models.* In the sciences, mathematics, and philosophy, we develop theoretical models to help us explain natural and human phenomena. By virtue of structural isomorphism, analogies, and propositional models, we attempt to represent entities, events, states, relations, and processes. Such models are representations of what they purport to be about.

In sum, people are never going to stop using the term *representation*. Nor should they. The term should be used when it is appropriate, which means whenever it does not activate any strong form of the representational theory of mind. The representational theory is incompatible with cognitive neuroscience and out of touch with evolutionary accounts of mind, thought, and language. It is philosophically problematic, because it reinforces a set of ontological and epistemological dualisms that make it impossible to explain meaning, understanding, knowledge, and values without relying on supernatural, or at least transcendent, realities. In our theories of meaning and mind, we must exercise due caution to avoid falling back into any form of the representational view of mind.

CHAPTER 7

The Corporeal Roots of Symbolic Meaning

In the previous chapter, I described patterns of organism-environment coupling mostly for nonhuman animals and argued that a strong representational theory of mind is of no use in explaining how such interactions work. For nonhuman animals, meaning is fully embodied. However, for human animals as well, meanings arise from organism-environment interactions, and we too have neural maps. The structural features and relations that shape our encounters with aspects of our environment are preserved in our neural maps.

In general, every aspect of our spatial experience will be defined by recurring patterns and structures (such as up-down, front-back, near-far, in-out, on-under) that constitute the basic contours of our lived world. It should not be surprising, therefore, that we have evolved to take special notice of these recurring shapes, relations, and patterns, and that these patterns exist as topological features of our neural maps. Such patterns are the structural elements of our ongoing engagement with our environment. They are one of the primary ways we are in touch with our world, understand it, and can act within it.

Since the earliest episodes of ancient Greek philosophy, humans have been inclined to distinguish themselves from "brute" animals and all lower organisms by their supposedly unique capacities for abstract conceptualization and reasoning that are typically associated with the possession of language. According to this view, human reason is a unique capacity having a different source than our capacities for perception, motor activities, feeling, and emotion. Therefore, the problem for an embodied view of cognition is to explain our marvelous human feats of meaning-making, abstraction, reasoning, and symbolic interaction, but without positing an ontological rupture between "lower" animals and humans, or between human "bodily" and "mental" processes. The question is, How can meaning emerge in our bodily experience (i.e., in sensorimotor activity) and still be the basis for abstract thought?

The key to ontological continuity is the coupling (the interactive coordination) of an organism (here, a human one) and its environment. Recurring, adaptive patterns of organism-environment interaction are the basis for our ability to survive and flourish. They are also the ground of meaning. Let us consider some of the most basic kinds of structural couplings that make up our human experience of our world.

IMAGE SCHEMAS AND CROSS-MODAL PERCEPTION

The character of our experience is delineated in large part by the nature of our bodies and brains, the kinds of environments we inhabit, our social interactions, and the values and purposes we have. The patterns of our ongoing interactions or enactions (to use the term from Varela, Thompson, and Rosch 1991), define the contours of our world and make it possible for us to make sense of, reason about, and act reliably within this world. What George Lakoff (1987) and I (Johnson 1987) called image schemas are precisely these basic structures of sensorimotor experience by which we encounter a world that we can understand and act within.

An image schema is a dynamic, recurring pattern of organism-environment interactions. As such, it will reveal itself in the contours of our basic sensorimotor experience. Consequently, one way to begin to survey the range of image schemas is via a phenomenological description of the most basic structural features of all human bodily experience. When I speak of a "phenomenological" survey of image schemas, I do not mean the use of anything like a formal Husserlian method of "transcendental reduction,"[1] but merely a reflective interrogation of the contours of our lived experience. Ask yourself what are the most fundamental structures of perception, object manipulation, and bodily movement, given that human bodies share several quite specific sensorimotor capacities that are keyed

1. Husserl proposed a method of "suspending" one's practical engagement with everyday experience in order to allow the fundamental structures of experience to reveal themselves. I do not think we should try to suspend our practical embeddedness; rather, we should survey the patterns of this practical interaction.

to the size and constitution of our bodies and to the common characteristics of the various environments we inhabit. Certain obvious patterns immediately stand out.[2] For example, because of our particular bodily makeup, we project right and left, front and back, near and far, throughout the horizon of our perceptual interactions. As Mark Turner (1991) observes, if we were nonsymmetric creatures floating in a liquid medium with no up or down, no right or left, and no front or back, the meaning of our bodily experience would be quite different from the ways we actually *do* make sense of things. For instance, there would be no "right" or "left" for us, neither in our experience nor in our conceptual system (if we had one).

Another fundamental organizing structure is tied to the fact that our perceptual fields have focal areas that fade off into a vague horizon of possible experiences that are neither currently in focus nor at the center of our conscious awareness. Hence, it comes as no surprise that we have a CENTER-PERIPHERY image schema, based on this horizonal character of our perception. Other image schemas are equally obvious. Because of our ongoing bodily encounter with physical forces that push and pull us, we experience the image-schematic structures of COMPULSION, ATTRACTION, and BLOCKAGE OF MOVEMENT, to name but a few aspects of what Leonard Talmy (1985) calls "force dynamics." The bodily logic of such force schemas will give rise to specific inferences that we draw, based on the internal structure of the schemas. For instance, objects move at varying speeds, they move along trajectories, there is a rhythmic flow to their movement, they start and stop, etc. Based on these and other characteristics of moving objects, the internal structures of the image schemas for forced movement support and constrain the precise inferences we make about our experience.

There are thus quite distinctive patterns and logics to these dimensions of our perception of moving objects, our kinesthetic sense of our own motion, and our proprioceptive sense of the position and movement of our body parts. Because we exist within a gravitational field at the earth's surface, and because of our ability to stand erect, we give great significance to standing up, rising, and falling down. Our understanding of these bodily experiences involves a VERTICALITY (UP-DOWN) schema and a BALANCE schema. Our experience of rectilinear motion gives rise to the inferences we draw about straight-line movement (Cienki 1998), and we draw

2. A survey of some of the structure and semantics of some of the more important image schemas is presented in Johnson 1987, chapters 2–5.

different inferences about curved motions, deviating motions, or motions that have no obvious goal (relative to a SOURCE-PATH-GOAL schema).

Because we must continually monitor our own changing bodily states, we are exquisitely attuned to changes in degree, intensity, and quality of feelings. Such experiences are the basis for our sense of the scalar intensity of a quality (the SCALARITY schema). In other words, because the qualities (e.g., redness, softness, coolness, agitation, sharpness) of our experience vary continuously in intensity, there is a scalar vector that applies to every aspect of our qualitative experience. For example, lights can grow brighter or dimmer, sounds can increase or diminish in loudness, stoves can get hotter or cooler, iced tea can get sweeter as we add sugar or more tart as we add lemon.

Because we must constantly interact with containers of all shapes and sizes, we naturally learn the "logic" of containment (for the CONTAINER schema). Containers have at least the minimal structure of a boundary, an interior, and an exterior. Through many experiences each day, we learn what the word *into* means, as we encounter the movement of objects as they pass from the exterior of a container across or through its boundary, finally coming to rest in its interior. We know, in a bodily way, that something that is inside a container is not outside it. We learn that if something starts moving within a container toward its boundary and eventually crosses over the boundary, then it is at least temporarily outside of the container.

Through this type of informal phenomenological analysis of the structural dimensions of our sensorimotor experience, most of the basic image schemas will show themselves. However, we must keep in mind that phenomenological analysis alone is never enough, because image schemas typically operate beneath the level of conscious awareness. That is why we must go beyond phenomenology to employ standard explanatory methods of linguistics, psychology, and neuroscience that allow us to probe structures within our unconscious thought processes. A great deal of our current knowledge of image schemas comes from linguistic analyses of their role in the semantics of spatial terms and bodily operations and of their role in conceptualizing and reasoning about abstract domains. Originally, Lakoff (1987) and I (Johnson 1987) hypothesized the existence of various image schemas in order to frame explanatory generalizations concerning syntactic, semantic, and pragmatic aspects of language and other forms of symbolic interaction. Over the past two decades, a burgeoning body of empirical linguistic research has explored the role of image-schematic structures in a vast array of syntactic and semantic phenomena in languages around the world.[3] Raymond Gibbs (1994) has described the main types of empirical evidence currently available for image schemas (see also Gibbs and Steen 1999). And there is considerable evidence concerning the role of image schemas in inference (Lakoff 1987; Lakoff and Johnson 1999; Lakoff and Núñez 2000).

Three important aspects of image schemas relating to the grounding of meaning can now be emphasized. First, image schemas are an important part of what makes it possible for our bodily experiences to have meaning for us. The meaning is that of the recurring structures and patterns of our sensorimotor experience. As such, it typically operates beneath the level of our conscious awareness, although it also plays a role in our discrimination of the contours of our bodily orientation and experience. Meaning structures of this sort are part of what Lakoff and I (1999) call the *cognitive unconscious*. For example, humans will share certain general understandings of what it means for something to be located within a container, and they will understand at least part of this without having to reflect upon it or think about it. Seeing a container, manipulating one, or hearing or reading the word *in* will activate a CONTAINER image schema in our understanding of a particular scene. Certain types and sizes of containers will offer different specific affordances—possibilities for interaction—for creatures with our types of bodies, brains, and environments.

Second, there is a *logic of image-schematic structure*. Consider a case in which you are moving along a linear path toward a destination, and at time T1 you are halfway to the destination. If you then travel farther along the path and reach time T2, you will be closer to your destination at T2 than you were at T1. This is part of the spatial logic of the SOURCE-PATH-GOAL schema. Or consider what follows if your car keys are *in* your hand and you then place your hand *in* your pocket. Via the transitive logic of containment, the car keys end up *in* your pocket. Such apparently trivial spatial logic is *not* trivial. On the contrary, it is just such spatial and bodily logic that makes it possible for us to make sense of, and to act intelligently within, our ordinary experience.

The third moral is that image schemas are not to be understood as either merely "mental" or merely "bodily," but rather as contours of what Dewey called the body-mind. Dewey recognized the underlying continuity that connects our physical interactions in the world with our activities

3. The journal *Cognitive Linguistics* is the principal source for cross-cultural analyses of image schemas in languages across the world, but see also Hampe and Grady 2005.

of imagining and thinking. He summarized the body-mind continuity as follows:

> But body-mind simply designates what actually takes place when a living body is implicated in situations of discourse, communication, and participation. In the hyphenated phrase body-mind, "body" designates the continued and conserved, the registered and cumulative operation of factors continuous with the rest of nature, inanimate as well as animate; while "mind" designates the characters and consequences which are differential, indicative of features which emerge when "body" is engaged in a wider, more complex and interdependent situation. (Dewey 1925/1981, 285)

If we could only disabuse ourselves of the mistaken idea that thought must somehow be a type of activity *ontologically* different from our other bodily engagements (such as seeing, hearing, holding things, and walking), then our entire understanding of the so-called mind/body problem would be transformed. We would cease to interpret the problem as how two completely different kinds of things (body and mind) can be united in interaction. Instead, we would rephrase the problem as that of explaining how increasing levels of complexity within organisms can eventually result in the emergence of progressively more reflective and abstractive cognitive activities, activities we associate with "mind."

I am suggesting that the very possibility of abstract conceptualization and reasoning depends directly on the fact that "body" and "mind" are not two separate things, but rather are abstractions from our ongoing, continuous, interactive experience. Although Dewey did not have the benefit of the elaborate analyses from today's cognitive science showing how meaning and thought are based on patterns of sensorimotor experience, he understood that what we think of as "higher" cognitive activities are grounded in, and shaped by, activities of bodily perception and movement:

> Just as when men start to talk they must use sounds and gestures antecedent to speech, and as when they begin to hunt animals, catch fish or make baskets, they must employ materials and processes that exist antecedently to these operations, so when men begin to observe and think they must use the nervous system and other organic structures which existed independently and antecedently. That the use reshapes the prior materials so as to adapt them more efficiently and freely to the uses to which they are put, is not a problem to be solved: it is an expression of the common fact that anything changes according to the interacting field it enters. (Dewey 1925/1981, 285)

If you treat an image schema as merely an abstract, formal cognitive structure, then you leave out its embodied origin and its arena of operation. On the other hand, if you treat the image schema as nothing but a structure of a bodily (sensorimotor) process, you cannot explain abstract conceptualization and thought. Only when image schemas are seen as structures of sensorimotor experience that can be recruited for abstract conceptualization and reasoning (see chapter 9) does it become possible to answer the key question: how can abstract concepts emerge from embodied experience without calling upon disembodied mind, autonomous language modules, or pure reason? Failure to recognize the nondualistic, mental-bodily reality of image schemas would cause the collapse of the whole project of utilizing image-schematic logic to explain abstract thought.

Image schemas are thus a crucial part of our nonrepresentational coupling with our world, just as barn owls and squirrel monkeys have image schemas that define their types of sensorimotor experience. One of the chief ways that humans are different is that we have neural mechanisms for metaphorically extending image schemas as we perform abstract conceptualization and reasoning. Moreover, we are capable of becoming aware of the way the dynamic flow of our experience and thought is structured by the CONTAINER, VERTICALITY, COMPULSIVE FORCE, SCALARITY, SOURCE-PATH-GOAL, and many other image schemas.

Image-schematic structure is the basis for our understanding of spatial terms and all aspects of our perception and motor activities. An example from Lakoff and Núñez (2000) illustrates how to conceive this image-schematic basis of spatial concepts and spatial language in humans. What we (speakers of English) call our concept *in* is defined for us by a CONTAINER image schema that consists generically of three parts:

1. a boundary, which demarcates
2. an interior
3. from an exterior.

When we say "The car is in the garage," we understand the garage as a bounded space; we profile (Langacker 1986) the interior of that space, and we regard the car as a Trajector within that space, with the garage (as container) serving as a Landmark in relation to which the Trajector is located.

Similarly, when we hear the sentence "Grandpa walked *from* the outhouse *to* the garage," we understand that situation via a SOURCE-PATH-GOAL schema that consists of

1. a starting point,
2. a destination (endpoint), and
3. a path from the starting location to the destination.

In other words, the *from-to* construction in English is image-schematic.

Many of our basic prepositional compounds are based on a compositional blending of two or more image schemas. The English word *into* (as in "Grandpa went *into* the barn") is understood via a superimposition of the CONTAINER schema and the SOURCE-PATH-GOAL schema, as follows:

- *In* activates a CONTAINER schema with the interior profiled.
- *To* activates a SOURCE-PATH-GOAL schema with the destination (endpoint) profiled.
- The destination (endpoint) is mapped onto the interior of the CONTAINER schema.
- We thus understand Grandpa (as Trajector) as moving from outside (source point of the SOURCE-PATH-GOAL schema) into, and terminating his motion within, the barn (which is a container and also the Landmark for the motion). The result is our simple understanding of motion along a path from the exterior to the interior of a container.

Into in English is thus an elementary composition of two image schemas.

Image schemas appear to be realized as activation patterns (or "contours") in human topological neural maps. As with much interdisciplinary research in the neurosciences, this finding was first discovered by intracranial neuronal recordings in monkeys and was later extended by analogous neuroimaging studies on humans. When Giacomo Rizzolatti and colleagues (Fogassi et al. 2001; see review in Rizzolatti and Craighero 2004) showed macaques visual images of another monkey grasping a banana with its hand, the researchers were able to record activity from "mirror" neurons in the same secondary somatomotor maps that would be implicated if the monkey itself were performing the particular grasping action. Analogous human neuroimaging experiments (Buccino et al. 2001), in which participants watched a video clip of another person performing a grasping action, showed increased activation in the secondary somatomotor cortices that are known to map hand and arm grasping motions. Rizzolatti and colleagues thus showed that these neural maps contain image-schematic sensorimotor activation patterns for grasping.

mirror neurons

An explicit attempt to model image schemas using known facts about our neural maps can be found in the neurocomputational literature. Terry Regier (1996) has developed what he calls "structured" or "constrained" connectionist neural models for a number of image schemas. "Constrained" connectionism builds into its neural models a small number of structures that have been identified in research on human visual and spatial processing. These include center-surround cell arrays, spreading activation, orientation-sensitive cells, and neural gating. Regier shows how these constrained connectionist models of image schemas can learn spatial-relation terms in different languages.

In addition to the evidence from the neurosciences, there is a growing body of research from developmental psychology suggesting that infants come into the world with capacities for experiencing image-schematic structures. Recall my earlier discussion (in chapter 2) of Daniel Stern's description (1985) of certain types of sensorimotor structures that infants are able to detect from birth. He argues, first, that these capacities form the basis for meaning and the infant's sense of self; and, second, that these capacities continue to play a central role in meaning, understanding, and thinking even in adults, who are capable of propositional thinking. The patterns of cross-modal perception, such as the infant's ability to correlate the pacifier he was sucking on with the pacifier he later sees, require intermodal connections between brain areas responsible for tactile and visual processing. Although Stern speaks of these structures of cross-modal perception as "abstract representations," his account does not necessarily entail a strong representational view. Rather, these are "representations" in the first of the four acceptable senses I discussed in chapter 6, since these perceptual structures are not inner mirrorings of external things, but rather the very contours of our experience itself.

Like infants, we adults have a ROUGH-SMOOTH image schema, which we use as we anticipate a change in surface texture as we walk. For example, we can see where we will step from the rough carpet of the hallway onto the slippery tile of the bathroom, and we transfer this information from the visual to the somatomotor system so that our feet will not slip. Such patterns of cross-modal perception are especially clear examples of how image schemas differ from being just a topographically mapped image in a neural map; they are sensorimotoric patterns of experience that are instantiated in and coordinated between the neural maps.

A second type of pattern that makes up the infant's (and adult's) image-schematic experience is Stern's vitality-affect contours, illustrated earlier with the notion of a "rush," or the swelling qualitative contour of a felt experience. We can experience an adrenaline rush, a rush of joy or anger, a drug-induced rush, or the rush of a hot flash. Even though these rushes are felt in different sensory modalities, they can all be characterized as a rapid, forceful building up or swelling contour of the experience across time. Stern notes that understanding how such affect contours are meaningful to creatures like us gives us profound insight into meaning generally, whether that meaning comes via language, vision, music, dance, touch, or smell. We crave the emotional satisfaction that comes from pattern completion, and witnessing even a portion of the pattern is enough to set our affect contours in motion. The infant needs only to see the parent *begin* to reach for the bottle, and she already begins to quiet down—the grasping schema does not even need to be completely realized in time before she recognizes the action. When as adults we hear a musical composition building up to a crescendo, this causes increasing emotional tension that is released at the musical climax. The emotional salience of the vitality-affect contours in image schemas shows that image schemas are not mere static "representations" (or "snapshots") of one moment in a topographic neural map. Instead, image schemas operate dynamically in and through time.

At this point, I can summarize my conception of image schemas as

1. recurrent, stable patterns of sensorimotor experience;
2. "image"-like, in that they preserve the topological structure of the perceptual whole;
3. operating dynamically in and across time;
4. at once "bodily" *and* "mental";
5. predicated on interaction with a wider environment;
6. realized as activation patterns (or "contours") in topologic neural maps;
7. structures that link sensorimotor experiences to conceptualization and language; and
8. having internal structures that give rise to constrained inferences.

Image schemas constitute a preverbal and mostly nonconscious, emergent level of meaning. They are patterns instantiated in the topologic neural maps we share with other animals, though we as humans have particular image schemas that are more or less peculiar to our types of bodies

and the characteristics of the environments we inhabit. Although they are preverbal, they play a major role in the syntax, semantics, and pragmatics of natural language. They lie at the heart of meaning, and they underlie language, abstract reasoning, and all forms of symbolic interaction.

IMAGE SCHEMAS BIND BODY AND MIND

Let us take stock of the argument so far. This chapter and the previous one are crucial steps in setting out the ontological framework that is required for a theory of cognition as embodied. It is a nondualistic ontology built around the principle of continuity, according to which there are no ontological ruptures or gaps between different levels of complexity within an organism. "Higher" cognitive processes have to emerge from complex interactions among "lower"-level capacities. If you start by assuming a radical difference in kind between the higher and lower forms of cognition, you will never bridge the gap between the two types (i.e., between the mental and the physical). As the history of Western philosophy has repeatedly demonstrated, once you break Humpty-Dumpty apart, you'll never put him back together again. Once you separate mind from body, inner from outer, conception from perception, reason from emotion, you will never find an ontological hermaphrodite in which these allegedly separate and distinct metaphysical kinds can be united.

The grounding assumption of the embodied cognition view is that Humpty-Dumpty was never broken, so there is no need to try to put him back together. As the pragmatists argued, experience was never ontologically bifurcated in the first place, even though we can always identify aspects of our unified experience and abstract them as if they were separate and distinct entities, structures, or processes. Experience comes whole and continuous. We make distinctions and abstract out patterns from this qualitative whole. On this view, cognition is an organic, embodied process of enaction in which the organism is dynamically engaged with its surroundings and is not separated or alienated from them. So, there is no need for inner ideas that could somehow capture what is outer and other (the world). We are, instead, *in* and *of* the world. The patterns of our engagement are sensorimotor patterns, image schemas, conceptual metaphors, and other imaginative structures.

Recalling my discussion of representations at the end of the previous chapter, we can now acknowledge the sense in which it would be appropriate to call image schemas "representations." For example, as mentioned earlier, a neural map in the brain does map topological aspects of experience. An image schema would be instantiated as a particular pattern within this map, and so one could speak of the image schema as representing some pattern "in the world." However, great caution is required in speaking of representations, for it is too easy to slide back into the classical representationalist doctrine of mind/body dualism. As soon as you turn from speaking of a "representation in the brain" (such as a neural map) to speaking of a "representation in the mind," you are off and running again with full-blown dualism. The concept of representation comes loaded with dualistic metaphysical and epistemological baggage that it ultimately cannot carry. It is true that naturalistic philosophers and most neuroscientists use the term *representation* in talking about cognition. But if you look carefully at second-generation (embodied) cognitive science, you will discover that they do not use this term to indicate the existence of purely *mental* entities (called "ideas" or "concepts"). As we will see in chapter 8, the neural activations that we call concepts are not re-presentations of experience. Rather, they are just structures of experience! Only if we stand back, as theorists, looking first at the neural patterns and then at what the organism under study is encountering in its environment (as perceptual input), can we regard the pattern, model, or activation as representing something else. For example, we think we know scientifically what is present to a person's retina, and we correlate that with neural connections activated in the various areas of the visual cortex. However, this sense of "representing" is innocuous—patterns in the visual cortex map patterns in the retina—and it does not support a classic representational theory of mind, because there is no "inner idea" re-presenting an "outer reality," since the outer reality is the world *as experienced.*

This having been said, there still remains a justifiable reason to use the term *representation* whenever we want to speak of words, signs, symbols, or actions as representations. For a scientific account of cognition, we don't need representations. But the term may be useful whenever we have formalisms that claim to capture the structure of something. In a colloquial sense, we can speak of a sign like *dog* as representing, or standing for, a certain furry canine. We can construct formal models and then place elements of those models in one-to-one relations with other symbols or things, and we can say that the first set of elements and structures "represents" the second set. Notice, however, that this sense of the term does not require or lend credence to the representational theory of mind, because it need not presuppose internal mental symbols.

THE SOCIAL, INTERSUBJECTIVE CHARACTER OF EMBODIED COGNITION

I have been presenting evidence for the embodied character of cognition, suggesting an appropriate pragmatist philosophical framework for interpreting that evidence. Contra representationalism, I have argued that cognition is not some inner process performed by "mind," but rather is a form of embodied action. I argued this by giving examples of how cognition is located in organism-environment interactions, instead of being locked up in some alleged private mental sphere of thought. However, an exclusive focus on the organism's engagement and coupling with its environment can lead to the mistaken impression that thought is individual, not social. Therefore, we must at least briefly address the crucial fact that language and abstract reasoning are socially and culturally situated activities. I cannot do justice to this important dimension here, but I want at least to identify the social dimension as essential to our capacity for meaning and thoughtful inquiry.

Thus far, I have discussed only one sociocultural dimension, that of cognitive development. My brief discussion of development was framed more within the context of nervous systems than within sociocultural interactions. I stressed the point that epigenetic bodily interactions with the world are what shape our neural maps and the image schemas in them. For humans, a very large and distinctive part of such engagement involves interacting with other humans. In other words, human understanding and thinking are social. This raises the question: how do socially and culturally determined factors come to play a role in human cognition?

In framing an answer to this question, two important mistakes must be avoided. The first mistake is to assume that humans are fundamentally different from other animals with respect to socially and culturally transmitted behaviors. In fact, human sociocultural influences are continuous with those of other animal species, even if there are distinct characteristics that arise with the acquisition of a human language. Second, having challenged the split between "inner mind" and "outer body," we must be careful not to replace it with another, equally problematic dichotomy—that between the individual and the social. We must recognize that cognition does not take place only within the brain and body of a single individual but is instead partly constituted by social interactions, social relations, and cultural artifacts and practices. The evidence to which I now turn comes from cognitive ethology and distributed cognition. Of course, there are ways in which our sociocultural behaviors are peculiarly human, but the story is, once again, much more complex and multidimensional than classical representationalists suppose.

Following Humberto Maturana and Francisco Varela (1998, 180–84), I would define social phenomena as those phenomena arising out of recurrent structural couplings that require the coordinated participation of multiple organisms. Maturana and Varela argue that just as the cell-to-cell interactions in the transition from single to multicellular organisms afford a new level of *intercellular* structural coupling, so also recurrent interactions between organisms afford a new level of *interorganismic* structural coupling.

The social insects are a good basic example of this kind of recurrent interorganismic behavior. For example, ants must feed their queen for their colony to remain alive. Individual workers navigate their way to and from the nest and food sources by leaving trails of chemical markers. When seeking food, an individual ant moves away from markers dropped by other ants. Naturally, the density of such markers decreases in proportion to the distance from the nest. But when one ant finds food, it begins to actively seek denser clusters of markers, thus leading the ant back to the nest. Furthermore, whenever a worker ant eats, its chemical markers change slightly. These markers attract, rather than repel, other ants. Thus, the ants gradually begin to form a column leading from a food source to the nest. Note that the ants' cognition is both social, in that it takes place between organisms, and distributed, in the sense that it offloads much of the cognitive work onto the environment. No single ant carries around an "internal representation" or neural map of where the ant colony is. Ant cognition is thus nonrepresentational in that it is both intrinsically social and situated in organism-environment interactions.

I am not claiming that ants have language or symbolic interaction of any sort. Quite the contrary; their "communication" is wholly unconscious and automated. Moreover, the social cognition of insects does not include the capacity for spontaneous imitation, which is so central to human abstract cognition. For a social behavior to become a learned behavior and then continue across generations, a capacity for spontaneous imitation is crucial. However, zoological ethologists have long known that this imitative capacity is not unique to humans. Researchers studying macaques left sweet potatoes on the beach for a colony of wild monkeys who normally inhabited the jungle near the beach. After gradually becoming habituated to the beach and becoming more familiar with the sea, one monkey discovered that dipping the potatoes in a tide pool would cleanse them of the sand that made them unpalatable. This behavior was imitated throughout the colony in a matter of days, although the researchers observed that older macaques were slower to acquire the behavior than the younger ones (Kawamura 1959; McGrew 1998). Maturana and Varela (1998, 203) define cultural behavior precisely as this kind of relatively stable pattern of transgenerational social behavior.

The culturally acquired behavior most often held up by classical representationalists as the hallmark of the distinctively human is language. However, even here there is not a clear break from the animal kingdom in terms of basic cognitive capabilities, as we see when considering the results of researchers who have been trying to teach symbolic communication to other primates. Instead, their observations are consonant with our theory of how language and image schemas emerge from bodily processes involving cross-modal perception. In experiments done by Sue Savage-Rumbaugh, Rose Sevcik, and William Hopkins (1988), three bonobo chimpanzees who had been trained in symbolic communication were able to make not only cross-modal associations (i.e., visual to tactile), but also symbolic to sensory-modal associations. For example, Kanzi was able to hear a spoken English word and accurately choose either the corresponding visual lexigram or a visual picture for the word. Sherman and Austin were able to choose the appropriate object by touch when presented with a visual lexigram, with 100 percent accuracy. Conversely, they were also able to choose the appropriate visual lexigram when presented with a tactile-only stimulus (Sherman, 96 percent correct; Austin, 100 percent correct) or olfactory-only stimulus (Sherman, 95 percent correct; Austin, 70 percent correct). Their ability to perform such symbol to sensory-modality coordination enhanced their performance on tasks measuring solely cross-modal coordination; as the researchers observe, "These symbol-sophisticated apes were able to perform a variety of cross-modal tasks and to switch easily from one type of task to another. Other apes have been limited to a single cross-modal task" (Savage-Rumbaugh, Sevcik, and Hopkins 1988, 623). Although these bonobos will never approach the linguistic capabilities of humans, the results show that our human capacity for abstract, cross-modal thought is shared by at least some members of the animal kingdom.

In fact, related recent research on primates has shown that it is the distinctively human sociocultural environment (and not some great discontinuity in comparative cognitive capacity) that facilitates the capabilities underlying language and abstract reason. We have already noted that the neural development of the cross-modal maps of juvenile owls can be modified by epigenetic stimulation, but it is equally important to realize that the cross-modal basis for many of our image schemas requires epigenetic stimulation of the kind presented by human parents. Michael Tomasello, Sue Savage-Rumbaugh, and A. C. Kruger (1993) compared the abilities of bonobo chimpanzees and human children to imitatively learn novel actions with novel objects. They tested three conspecific (mother-reared) chimpanzees and three enculturated (human-reared) chimpanzees, along with eighteen- and thirty-month-old human children. They introduced a new object into the participant's environment, and after observing the participant's natural interactions with the object, the experimenter demonstrated a novel action with the object with the instruction "Do what I do." Their results showed that the mother-reared chimpanzees were much poorer imitators than the enculturated chimpanzees and the human children, who did not differ in their results. From these two studies taken together, we can conclude that a human-like sociocultural environment is an essential component not only for the development of our capacity for imitation, but also for the development of our capacities for cross-modal image schemas, language, and abstract reasoning.[4]

Finally, there is also considerable evidence from cognitive anthropology that adult humans do not think in a manner consistent with the dichotomies posed by classical representationalism. Like the social insects, we tend to offload much of our cognition onto the environments we create. We tend to accomplish this in two ways: first, we make cognitive artifacts to help us engage in complex cognitive actions (Clark 1998); and, second, we distribute cognition among members of a social organization. As an example of the first way, Edwin Hutchins (1995, 99–102) discusses how medieval mariners used the thirty-two-point compass rose to predict tides. By superimposing onto the compass rose the twenty-four-hour day (in forty-five-minute intervals), the mariners could map the lunar "time" of the high tide (the bearing of the full moon when its pull causes a high tide) to a solar time of day. As long as they knew two facts—the number of days since the last full moon and the lunar high tide for a particular port—they could simply count off a number of points on the compass rose equal to the days past the full moon in order to compute the time of the next high tide. Without the schema provided by the cognitive artifact, computing the next high tide would have been a much more laborious cognitive task.

4. This conclusion is further supported by results showing that human children with specific language impairments show deficiencies in their ability to perform cross-modal tasks (Montgomery 1993).

As an example of the second way of offloading the work of cognition onto our environments, Hutchins (1995, 263–85) discusses how the partially overlapping knowledge of a group of three navy navigation personnel is distributed among the team. Because the participants know the spatial relations and procedures immanent to another team member's job, the overlaps function as a brake on navigational errors that could imperil the ship. In short, both socially distributed cognition and cognitive artifacts are environmental factors that we use in our daily cognitive feats.

A fully adequate treatment of the social and cultural dimensions of thought would require substantially more evidence and analysis. I have only attempted to suggest that cognition cannot be locked up within the private workings of an individual mind. Since thought is a form of coordinated action, it is spread out in the world, coordinated with both the physical environment and the social, cultural, moral, political, and religious environments, institutions, and shared practices. Language—and all forms of symbolic expression—are quintessentially social behaviors. Dewey nicely summarizes the intrinsically social character of all thought in his argument that the very idea of thinking as a kind of inner mental dialogue is only possible because of socially established and preserved meanings, values, and practices:

> When the introspectionist thinks he has withdrawn into a wholly private realm of events disparate in kind from other events, made out of mental stuff, he is only turning his attention to his own soliloquy. And soliloquy is the product and reflex of converse with others; social communication not an effect of soliloquy. If we had not talked with others and they with us, we should never talk to and with ourselves. Because of converse, social give and take, various organic attitudes become an assemblage of persons engaged in converse, conferring with one another, exchanging distinctive experiences. . . . Through speech a person dramatically identifies himself with potential acts and deeds; he plays many roles, not in successive stages of life but in a contemporaneously enacted drama. Thus mind emerges. (Dewey 1925/1981, 135)

Thus mind emerges. It emerges as, and is enacted through, social cognition. I think it is therefore accurate to say that we are not born with minds fully formed and ready for thinking. Instead, we acquire "minds" through our coordinated sharing of meaning and our concomitant ability to engage in symbolic interaction. Infants have primitive cognitive capacities that, through interaction with the world and other people, become functioning minds. On this view, mind is a matter of degree, stretching from the primitive mindedness of new babies to the more developed mindfulness of adults. If a person loses her capacities for consciousness and her abilities to experience meaning, she could be said to "lose her mind." Mind is an achievement, not a pre-given faculty. There is no radical rupture between our higher cognition and our bodily experience of meaning; instead, that meaning is carried forward and given voice through language and other forms of social symbolic interaction and expression.

Finally, meaning does not reside in our brain, nor does it reside in a disembodied mind. Meaning requires a functioning brain, in a living body that engages its environments—environments that are social and cultural, as well as physical and biological. Cultural artifacts and practices—for example, language, architecture, music, art, ritual acts, and public institutions—preserve aspects of meaning as objective features of the world. Without these cultural artifacts, our accumulated meaning, understanding, and knowledge would not be preserved over time, and each new generation would have to literally start over from scratch. Fortunately, because of social and cultural cognition, we do not have to relearn the meaning of our world. Each child, and each social group, can appropriate those objects and activities in which a culture's meanings and values are sedimented. However, we must keep in mind that those sociocultural objects, practices, and events are not meaningful in themselves. Rather, they become meaningful only insofar as they are enacted in the lives of human beings who *use* the language, *live by* the symbols, *sing* and *appreciate* the music, *participate* in the rituals, and *reenact* the practices and values of institutions.

A PRAGMATIST PERSPECTIVE ON EMBODIED MEANING

I have been arguing against disembodied views of mind, concepts, and reasoning, especially as they underlie representational theories of mind and language. My alternative view—that cognition is embodied—has its roots partly in American pragmatist philosophy, and it is being supported and extended by recent work in second-generation cognitive science. Pragmatists like James and Dewey understood that philosophy and empirical science must develop in mutual cooperation and criticism, if we are ever to have an empirically responsible and philosophically sound understanding of the human mind and all of its marvelous capacities and acts. Pragmatism and cognitive science of the embodied mind are characterized by (1) a profound, nonreductionist respect for the richness, depth, and complexity of human experience and cognition; (2) an evolutionary perspective that appreciates the role of dynamic change in all development (as opposed to fixity and finality); (3) a commitment to the embodiment of meaning, tied to the continuity of body and mind; and (4) recognition that human cognition and creativity arise in response to problematic situations that involve values, interests, and social interaction. The principle of continuity marks the fact that apparently novel aspects of thought and social interaction arise naturally via increased complexity of the organism-environment interactions that constitute experience. Pragmatists thus have an embodied cognition perspective, and they argue that all of our traditional metaphysical and epistemological dualisms (e.g., mind/body, inner/outer, subject/object, concept/percept, reason/emotion, knowledge/imagination, and theory/practice) do not mark irreducible ontological distinctions but are merely abstractions from the continuous interactive (enactive) process that is experience. Such distinctions are not absolute ontological dichotomies. Sometimes they serve us well, but often they serve us quite poorly, depending on what problems we are investigating, what values we have, and what the sociocultural context is.

The themes I have been tracing throughout this and the previous chapter—our engagement and cognition as human animals, our ongoing coupling with and our falling in and out of harmony with our surroundings, and the grounding of meaning in our bodily perception and action—are beautifully encapsulated by Dewey in a passage in which he identifies the whole life process of meaning-making as it is intimately tied to aesthetic dimensions of experience:

> At every moment, the living creature is exposed to dangers from its surroundings, and at every moment, it must draw upon something in its surroundings to satisfy its needs. The career and destiny of a living thing are bound up with its interchanges with environment, not externally but in the most intimate needs.
>
> The growl of a dog crouching over his food, his howl in time of loss and loneliness, the wagging of his tail at the return of his human friend are expressions of the implication of living in a natural medium which includes man along with the animal he has domesticated. Every need, say for hunger for fresh air or food, is a lack that denoted at least a temporary absence of adequate adjustment with surroundings. But it is also a demand, a reaching out into the environment by building at least a temporary equilibrium. Life itself consists of phases in which the organism falls out of step with the march of surrounding things and then recovers unison with it—either through effort or some happy chance. . . .

Dewey

> These biological commonplaces are something more than that [mere biological consequences]; they reach to the roots of the esthetic in experience. (Dewey 1934, 535)

We humans are live creatures. We are acting when we think, perhaps falling in and out of step with the environment, but never are our thoughts outside of it. Via the aesthetics of our bodily senses, the environment enters into the very shape of our thought, sculpting our most abstract reasoning out of our embodied interactions with the world.

CHAPTER 8

The Brain's Role in Meaning

WHY COGNITIVE NEUROSCIENCE MATTERS

Throughout this book, my oft-repeated mantra has been this: in order to have human meaning, you need a human brain, operating in a living human body, continually interacting with a human environment that is at once physical, social, and cultural. Take away any one of these three dimensions, and you lose the possibility of meaning: no brain, no meaning; no body, no meaning; no environment, no meaning. Although the brain alone cannot give us meaning, it is surely the supreme bodily organ in the construction of meaning. That is why I find it disturbing that most traditional accounts of meaning have so little to say about the sciences of the body and the brain. Until quite recently, the vast majority of philosophers of mind and language went cheerfully about their business of constructing theories of syntax, semantics, pragmatics, mental states, representation, and values without so much as a nod toward the neural and bodily bases for these aspects of cognition.[1]

1. I am referring here primarily to traditional analytic philosophers of mind and language and to what Lakoff and I (1999) have called "first-generation" or "disembodied" cognitive science. What I find so encouraging is the excellent work appearing over the past two decades by two groups: philosophers attentive to developing cognitive science and cognitive neuroscientists who are philosophically sophisticated. It is now clear that anyone coming into the study of mind and language today must have at least a basic knowledge of recent developments in the cognitive sciences.