Chapter 5

The Human World

When I am writing at night, my cat claims my lap as a right. I set him down; within minutes he is back, so I work around him. I often wonder what he thinks is happening, what sort of cat he thinks I am, what my lap is. He lives in a cat-world, filled with cat-created objects and cat-created values. I live in a human world. It is arguably more complex—I have language and the cerebral hardware for long-term planning—but the basic dynamics of structuring are similar. I inhabit the world—whatever it may be—in a human body, he in a cat. Much depends upon these facts.

The neuroscientific models crucially participate in human self-understanding because the microstructures of perception, cognition, emotion and memory shape the contours of our engagement with the world. What makes our experience *human* are the particular characteristics of the human body and human brain. What makes my experience *mine* is precisely the complex interaction between my body and brain and the particular history into which they have been thrown.

We have seen how the genetically coded emotional systems of the body and brain that signal biological salience guide the structuring of semantic organization. This chapter explores how neural structures then build structures upon structures to create the system of evaluation, planning and response that we call the self but also introduces a crucial complication: not all the patterns contributing to the emergence of the self are internal. We are part of a larger human world, and we are born into its structures just as we are born into our bodies. This human world

thus has two aspects: internal and external. The first part is the human cast of empirical knowledge: this is the world as we humans can know it through the particularity of our bodily, sensory, and neural organization. We do not have access to things in themselves, just our human representations of whatever falls within our capacity for experience. The second sense of the human world seems quite different and more mundane: it is the humanly shaped world that includes parents and children, homes, jobs, our complex and conflicted social organization, as well as the long legacy of human culture. These two versions of the human world, however, are related. The humanly shaped environment has grown out of what we can see, feel, and think: we have tried to shape the world according to our needs. Conversely, on an evolutionary time scale, these created external structures in turn have shaped the internal organization of our capacities to think, feel, and act.

The third and fourth chapters have sketched the neural mechanisms that underlie the basic human structuring of experience (i.e., the human world in its internal sense). This chapter explores the interaction between these neurobiological processes and the structures of the humanly built environment (the human world in the external sense). Interaction with the external world is central to any account of the articulation of embodied semantic structures because memory is in the service of action. And to act effectively, one must learn the contours of the body and the world. The story begins where the fourth chapter left off, with the affectively charged mechanisms for the creation of semantic memory. Within its structures, semantic memory organizes a map of meaningful actions, and the patterns of acting and being acted upon, their contexts, and their consequences

shape a cortically articulated self. The growth of this self is slow and embedded in the same developmental logic as the rest of the brain's representational structures. As representations build upon themselves and grow ever more complex and powerful, there is nonetheless a continuum between the first perceptions of a neonate, an infant's discovery of the joys of peek-a-boo, and the moral musings of an adult. As the neural structures become more complex, however, the level of description through which to describe the logic of development shifts. Neurobiological focus on foundational structures shifts to the growth of cognitive and affective capabilities charted by developmental psychologists and then to the probings of structure and dynamics in cognitive psychology and psychoanalysis. One of the important trends in the past decade has been the growing recognition—aided by the spread of neural network paradigms—that these disciplines all are talking about the same fundamental structures and processes. This chapter brings together work in these fields—neurobiology, developmental psychology, and psychoanalysis—to follow the development of the neuronal self from one organizational level to the next. This integration of perspectives seeks to elucidate the particular contours of the arc of development as the nascent self draws upon the structures of the human world in its slow yet remarkable self-creation.

Building a Self

Chapter Four described the creation of an affectively organized semantic memory as a way of binding the featural information provided by the sensory cortical

structures according to a logic of biological salience. The question, then, is how a self arises out of this semantic memory. How much of the emerging structure is determined by genetics and very early somatic history, and how much is an internalization of external environmental structures? What, for that matter, are we talking about? What is this self? A first version already introduced is simply the internal cortical structures for action, evaluation and response. This is a corollary to the homunculus, the imp in the brain who decides what we decide. However, this self is also very general and not limited to humans: it also applies, for example, to the mechanism by which bees decide where to fly. Is it useful to be this inclusive? Probably not. If not all internal control systems are selves, however, where do selves begin? What counts? Antonio Damasio's proto-self is perhaps a good starting point. This proto-self is a coherent system for representing the body and changes in body state. A self built upon the representational maps of the proto-self should evolve a system of autonomous semantics as well as decision processes that use the semantic information.[1] This means that any successfully embodied robot is a candidate for having a self, which seems fair. There also are more elaborate versions of the self corresponding to our more usual habits of usage that play a role in the developmental account. A *second-order* structural self, for example, would be a representation of the physical self within semantic memory. Similarly, a *third-order* structural self would be a representation of the decision-making structures themselves within semantic memory. These two ways of

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[1] See Chapter 4, pp. 151-52 and 166-68.

internally representing the self correspond to what William James called the "me-self," while the decision making structures themselves correspond to his "I-self."[2]

To offer a concrete example of these distinctions, I return to my cat Kleist. Kleist loves playing with balls of aluminum foil, while my more sedate cat, Ernie, is unmoved. When I get the foil out for any purpose, Kleist comes running. I have no difficulty concluding that he clearly makes decisions based on his own peculiar criteria. Kleist, that is, has a Jamesian "I-self." He also has an internal representation of his physical self, although I am not sure how elaborate it is. For example, Kleist likes to sleep on top of bookcases. To make the leap, he needs an accurate sense of how high his body can spring. I have watched him assess his chances, and he usually is right. This requires some representation of his bodily abilities. In contrast, however, he probably does *not* have an internal representation of his body as a whole. At about fifteen months, but not before, human children can see themselves in the mirror, notice a spot of rouge put on their noses, and realize that the nose in the mirror is their own. This self-recognition seemingly requires the maturation of higher level cortical structures in a child and appears to be beyond the capacity of my cat Kleist. At least I never catch him looking in the mirror.

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[2] For an overview of James' influential approach (as well as other models), see "Contemporary Issues and Historical Perspectives," the first chapter of Susan Harter, *The Construction of the Self: a Developmental Perspective* (New York and London: The Guilford Press, 1999), pp. 1-27.

Five Developmental Perspectives on Self-Representation

What is the nature of the changes in the human child that make self-representation possible? How does it happen? Neuroscientists who study early development are working intently to describe the changes in the brain from gestation, through birth and infancy. As discussed in Chapter 4, some circuits in the brain are mature at birth, but many mature more slowly. Maturing here refers to the migration of neurons to their final position in the cortex, to the creation of active synapses, and to the progressive myelination of the neurons, which makes transmission of activation far more efficient. The outer layers of the sensory cortex continue to develop in the early months of infancy. The frontal cortex—considered the locus of working memory for higher order integrations—as well as the cingulate cortex and nucleus basalis, important in control of attention, develop more slowly.[3] The model is of a phased increase in representational (feature-detecting) structures, in computational space to process these structures, and in the mechanisms available to control access to the processing structures.

How do these changes in brain function lead to the creation of the complex representational structures of the self? This question is beyond the reach of contemporary neuroscience, which lacks models for even such intermediate structures as plans or even action sequences. However, developmental psychologists for the past seventy years have been acutely aware of the issues of

structure and structural elaboration. They have formulated accounts of infant and child development at levels of abstraction from the surface of experience that come close to the paradigms of neuroscience. The gap is small, and the models help outline what a neuroscientific account might look like. Four key figures whose work can contribute powerfully to a future synthesis to explain the infant's transition to selfhood are Lev Vygotsky, Jean Piaget, Donald W. Winnicott, and John Bowlby.[4] All are concerned with the process by which internal cognitive structures are created and then serve as the basis for later development. That is, they are constructivists.[5] Jean Piaget (1896-1980) is best known. He focuses on the stages whereby the growing infrastructure of perceptual ordering makes ever higher levels of abstraction possible. His stages of sensorimotor intelligence (birth to 18 months), preoperatory representation (to about 7 to 9 years), concrete operations (7 to 12), and formal operations (after 12) have been extremely influential in cognitive and educational psychology. While more recent work disputes both the timing and the holistic thrust of Piaget's stages (i.e., that all categories of thought reach the same stage at the same time), Piaget's basic

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[3] For a review of the these issues, see N. Herschkowitz, J. Kagan, and K. Zilles, "Neurobiological Bases of Behavioral Development in the First Year," *Neuropediatrics* 28 (1997): 296-306.

[4] Each of these psychologists is part of a larger intellectual milieu, and other teachers and collaborators that shaped their thinking could be mentioned. However, these four names in particular appear to be central to contemporary constructivist developmental paradigms.

[5] Look in *Beyond Innateness* to get an account of constructivism.

insistence on the growth of substructures that undergird conscious thought remains central to the constructivist project.[6]

Lev Vygotsky(1896-1934), a Russian psychologist born in the same year as Piaget, was interested in learning and also turned to a structural account. He knew of Piaget's work but objected that Piaget focused too exclusively on development as the maturation of innate responses and thus missed the importance of the dynamics of interaction.[7] In particular Vygotsky stressed the process of internalization in learning to control the external world.[8] He analyzed internalization as a "series of transformations:"

1. An operation that initially represents an external activity is reconstructed and begins to occur internally.

2. An interpersonal process is transformed into an intrapersonal one.

3. The transformation of an interpersonal process into an intrapersonal one

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[6] For example, Piaget argues for a distinction between accessible consciousness—a result—and the inaccessible structural processes that make consciousness possible.

> Thus the cognitive unconscious consists of a set of structures and functionings ignored by the subject except for their results. It was for profound reasons that Binet once stated this truth as though it were a whim: "Thought is an unconscious activity of the mind." What he wanted to say was that if the self is conscious of the content of its thought, it knows nothing of the structural and functional reasons which force it to think in this or that manner, in other words, of the intimate mechanism which directs thought.

Jean Piaget, *The Child and Reality: Problems of Genetic Psychology*, trans. Arnold Rosin (Harmondsworth: Penguin, 1976), pp. 33-34. This distinction between enabling structure and manifest results is implicit in the constructivist approach.

[7] See Lev Vygotsky, *Mind in Society: the Development of Higher Psychological Processes*, edited by Michael Cole, Vera John-Steiner, Sylvia Scribner, and Ellen Souberman (Cambridge, MA: Harvard University Press, 1978), pp. 80-81.

[8] For an overview of the development of Vygotsky's thought see Norris Minick, "The Development of Vygotsky's Thought," in Harry Daniels, ed. *An Introduction to Vygotsky* (London and New York: Routledge, 1996), pp. 28-52.

> is the result of a long series of developmental events.[9]

Internalization occurs primarily through the development of sign operations that become tools for realizing particular goals, and the preeminent medium through which humans learn sign structures is through language. Vygotsky considered that the sorts of problems that a child can solve with a few leading questions from an adult reflect the structures that the child is in the process of internalizing. These nearly mastered problems in turn serve as far better indicators of the child's developmental level than any measure of the tasks the child has fully mastered. These partially assimilated interpersonal processes constitute what Vygotsky called the zone of proximal development. The concept of the zone of proximal development, along with the idea of the structural processes underlying the transformation of the interpersonal into the intrapersonal, have been extremely fruitful in more recent accounts of child development.

Contemporary approaches recognize that Vygotsky provides a mechanism to account for the process of self-formation explored by Donald W. Winnicott.[10] Winnicott, one of the important object relations theorists in British psychoanalysis, reflected on the infant's world before object relations formed:

> What then preceded the first object relationship? For my own part I have had a long struggle with this problem. It started when I found myself saying in this society [the British Psycho-Analytic Society] (about ten years ago) and I said it rather

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[9] Vygotsky, *Mind in Society*, pp. 56-57.

[10] For an overview of object relations theory in psychoanalysis and Winnicott's place in its development, see Jay R. Greenberg and Stephen A. Mitchell, *Object Relations in Psychoanalytic Theory* (Cambridge, MA: Harvard University Press, 1983).

> excitedly and with heat: "*There is no such thing as a baby*." I was alarmed to hear myself utter these words and tried to justify myself by pointing out that if you show me a baby, you certainly show me also someone caring for the baby, or at least a pram with someone's eye and ear glued to it. One sees a "nursing couple."[11]

Winnicott continues by explaining the emergence of the self out of an initial dyadic relationship:

> In a quieter way today I would say that before object relationships, the state of affairs is this: that the unit is not the individual, the unit is the environment-individual set-up. The centre of gravity of the being does not start off in the individual. It is in the total set-up. By good-enough child care, technique, holding, and general management the shell becomes gradually taken over and the kernel (which has looked all the time like a human baby to us) can begin to be an individual.

Winnicott reassuringly argues that because babies need to gradually discover their own capacity to act, parenting after the very earliest stages has to be simply "good enough" to assure an adequate transition. Winnicott's stress on the limits of an infant's innate conceptual knowledge and on the infant's self as emerging out of the pattern of relationships in the mother-child dyad remain constantly cited in contemporary constructivist discussions of the emergence of the self.

John Bowlby is the final earlier theorist who appears throughout contemporary discussions of structural articulation in child development. Bowlby participated in the same British psychoanalytic circle as Winnicott: they both were analyzed by Joan Riviere, a principle student of Melanie Klein, and for a while both

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[11] Donald W. Winnicott, "Anxiety Associated with Insecurity" in *Collected Papers: through Pædiatrics to Psycho-Analysis* (London: Tavistock, 1958), p. 99.

were supervised by Klein herself.[12] Just as Winnicott brought his extensive experience as a pediatrician to revising Freud's and Klein's accounts, so Bowlby introduced other forms of empirical research to reshape received theory. Bowlby was deeply concerned about the plight of war orphans at the end of World War II and sought to explain the quality of mourning he observed in children separated from their parents. Bowlby drew upon evolutionary thought, ethology, and general systems theory to develop a theory of the dynamics of infantile attachment. His initial approach was fairly sharply focused on a biologically primed requirement for physical proximity that was the human corollary of the imprinting observed in other species:

> At an abstract information-theoretic level, if a system is to survive there must be certain invariants among its constituent elements, and certain invariants in its relationship with the environment.... Furthermore, if a system does not have the ability to control input from the environment in a manner that keeps the essential variables within the limits required for survival, then it must be "coupled" with another system that does have the ability to keep the variety in the first system within such limits....[13]

Attachment behavior in a new-born infant—grasping, crying, smiling—are essentially reflexes to assure a coupling with an adult. In Bowlby's model, however, as the young system (the child) learns ways to control both internal states and the

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[12] Jay R. Greenberg and Stephen A. Mitchell, *Object Relations in Psychoanalytic Theory*, p. 184.

[13] Robert S. Marvin and Preston A. Britner, "Normative Development: the Ontogeny of Attachment" in Jude Cassidy and Phillip R. Shaver, eds. *Handbook of Attachment: Theory, Research, and Clinical Applications* (New York: The Guilford Press, 1999), p. 46.

environment, the need for coupling grows less stringent. In addition to the repertoire of fixed patterns, the infant acquires increasingly complex forms of "goal-corrected behavior." These more complex actions require internal representations of goals, action possibilities, the self, and the environment. Bowlby called this growing structure of representations the "internal working model." The term draws upon both important senses of "working model:" first, it is a work in progress, adapting and evolving to meet both external and internal changes, and secondly, it is a structure with a purpose, created to solve problems and realize goals.

Bowlby's model is an elegant and powerful synthesis of many strands of developmental thought, but babies are not very good experimental subjects. How does one assess internal working models, attachment behavior, and their relationship to a child's larger patterns of interaction? Mary Ainsworth, Bowlby's student, developed a seemingly simple scenario to evaluate the quality of attachment which has proven a remarkably robust metric in long-term studies of human development. This test, the so-called "strange situation," examines an infant's response to being left with a stranger and then being rejoined by its parent (usually the mother). Ainsworth proposed three categories to describe the responses: securely attached, insecure-resistant, and insecure-avoidant. The securely attached infant goes to its mother, is calmed by being held (if upset), and quickly returns to playing. The resistant "were more clingy, cried intensely during the very brief period while their mothers were absent, and wanted to be picked up

when they returned."[14] However, once picked up, they still were unhappy and continued to squirm and kick. An avoidant infant, in contrast, turned away from its mother when she returned and/or ignored her when she tried to play. Later research added a fourth category—insecure-disorganized—for infants "with puzzling behavior (such as disoriented movements, dazed expressions, brief gestures of fearfulness, prolonged stilling...) that repeatedly and unaccountably intrude into the more familiar reunion patterns."[15] The experimental procedure proved highly repeatable, and its results could be correlated with other aspects of both the parent-child relationship and the child's style of exploring the world. This second correlation led Ainsworth to expand her focus to examining the role of the parent in serving as a "secure base" for infant activity in the more natural setting of the home. In any case, the reliability of the approaches to attachment and the sense that they measure something important in childhood development has led to the creation of Attachment Theory as an important field in developmental psychology.

Fitting the Pieces Together

A new-born infant's cortical structures are not fully developed, nor are they very functional. Since their purpose is to respond effectively to the encountered world, this initially sketchy organization allows extraordinary flexibility. The brain,

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[14] Explanations of the procedure and its evaluations abound, but here I use the account in Inge Bretherton and Kristine A. Munholland, "Internal Working Models in Attachment Relationships: A Construct Revisited" in Cassidy and Shaver, *Handbook of Attachment: Theory, Research, and Clinical Applications*, pp. 99-101.

however, is not a *tabula rasa*: the general connectivity, the structures, and physiological functions all are in place to build a functioning human by directing synaptic growth through regular developmental patterns. The work of the psychologists discussed in the previous section goes a long way toward explaining these patterns.

The theme reappearing at every phase of development is the internal modeling of external patterns marked for particular importance. It is vital to stress, however, that, as all the theorists argued, the internal pattern is *not just a copy of the external*. Starting from nothing, the brain builds ever more complex layers of feature detectors based on a logic of mutual differentiation. Cortical structures evolve through a similar logic to capture the significance associated with ever more complex patterns of features. In the meantime, the constant ebb and flow of hormonal stress states bias the entire system to shape the memory structure. As memory grows—and as attentional, processing, and motor control systems mature—these memories become ever more crucial internal mediating components in evaluating and responding to input. These memories, moreover, determine a categorical organization that builds upon itself to further articulate the internal structure.

This process of growth and elaboration is the picture from the inside. Vygotsky, Winnicott and Bowlby rightly insisted, however, that we are describing a baby, not a Turing machine, that the external patterns that matter and are

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[15] Bretherton and Munholland, "Internal Working Models in Attachment Relationships," p.

assimilated are those of a caregiver-child dyad. Winnicott and Bowlby focused in particular on crucial patterns of regulation: feeding, stimulating, and soothing. The shift in these biological processes from the parent's control to a growing mutuality with the child marks the course of infant development. Researchers today study this process in detail: they chart the point when infants become sensitive to particular types of patterns and their disruptions; they seek to determine *what* in the pattern actually matters and thus to clarify the nature of cognitive structures, and they seek to understand the relationship of the particularity of internal organization at one stage to the behavior and development at the next. Since the focus of all these core patterns is on regulation, response, and action, in the end researchers want to know in detail how selves emerge out of dyads.

When a child is first born, the caregiver responds to the infant's needs. Within days, however, the child has learned aspects of the routine and can grow unhappy if it changes. Such pattern learning is quite remarkable for a neonate that still cannot distinguish very much in its visual field, but the routine itself is highly charged and involves precisely the sort of maintenance of systems that Bowlby considered the basis of attachment. Over the next three months, connections in the sensory cortex mature, and attentional and voluntary systems develop. Social smiling begins to replace "obligatory smiling." Hand and eye movement achieve some linkage. After three months, a baby will open its mouth if it sees a bottle or nipple. Although at this age, the caregiver still primarily controls the interactions,

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the baby begins to start activity by turning toward people, gurgling, cooing, and the like. If the caregiver responds to the gaze, smile, or reaching, new, more active and mutually structured patterns of contact are created. By six to nine months, a new phase begins: the baby starts to crawl, to explore, and in emergencies, knows to head towards its caregiver. The dynamic of the relationship involves the caregiver's recognizing that the baby now has goals and assisting the baby in realizing those goals, unless, of course, they include exploring kitty-cat's eyes, which calls for gentle suasion. This is the beginning of Bowlby's "goal corrected partnership." The baby makes more use of the vocal cords, and the caregiver engages in "conversation:" the baby learns the pattern of taking turns both in speech and in simple play like nose-touching or the parental favorite, fetch. Feeding, for better or worse, becomes a game with its own baby-invented rules. The infant's cognitive structures are now sufficiently developed for clear attachment to a particular caregiver and, correspondingly, for wariness and stranger anxiety. If all is going well, at the end of this phase, patterns of interaction with the caregiver are sufficiently stable to be internalized as a secure basis. The "internal working model" proves portable: the infant knows what actions will invoke the caregiver so that physical proximity is no longer quite so necessary. The baby's range of exploration increases. Social referencing—checking up with the caregiver to get evaluations—develops and further eases engagement with the world. It is in this period that Ainsworth's "strange situation" evaluates the character of the infant's internal working model. The child at the end of this stage reveals "the seeming paradox that the [securely attached] infant who is effectively dependent—who

operates successfully from within the caregiver-infant relationship—later shows more effective functioning outside of this relationship—that is, is more capable of independent functioning."[16] Vygotsky, Winnicott, and Bowlby all foretold this result: the internalization of the patterns of action and response developed *between* the child and the caregiver within their relationship creates the *internal* structures for actions and expectations that are at the core of the self.

Researchers stress that the creation of the initial internal working model out of the patterns of dyadic regulation defines the central developmental dynamic:

> Impressive development occurs in the years just after infancy, development that again is characterized by qualitative change and transformation. Major changes include the advent of symbolic representation and language, self-awareness and the beginnings of self-control. Yet despite the profound changes that occur during this period, the same principles that governed development in infancy are again apparent. Development is unified and orderly, building on what was previously present yet moving to progressively new levels of complexity.... As regulation orchestrated by the caregiver prepared the way for truly dyadic regulation in infancy, so too there is a transition here, wherein self-regulation supported and guided by caregivers precedes regulation by the child outside of the caregiving matrix.[17]

The autonomous self, in this view, arises out of internalized structures that represent the relationship of the self to the world at increasingly higher orders of abstraction. L. Alan Sroufe outlines this growth of the self:

> Self-awareness and an understanding of the self and others as agents proceed in parallel, with three phases described during

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[16] L. Alan Sroufe, *Emotional Development* (Cambridge: Cambridge University Press, 1996), p. 151.

[17] L. Alan Sroufe, *Emotional Development*, p. 192.

> the toddler period. At 12 months children recognize that others can do things they cannot, but they don't seem to grasp that others are agents in their own right. Infants may mimic parents who cover their own faces with their hands; then, when lifting their hands away infants seem surprised to find the parents' faces still covered. The distinction between the two sets of hands and faces is not clear.
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> Later in the second year children seem able to understand the boundaries between their own and other's actions, allowing them to engage in genuine turn taking. An understanding of the "other" is still limited, however. They know the parent's hands must be removed, but infants may not wait for the parent to do it. Instead assuming both roles and removing the parent's hands themselves.
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> Then by the end of the second year, there emerges a genuine understanding that the self and others are independent agents; that is, both actors in the social exchange are playing separate roles. Now toddlers, for example, play a real game of hide-and-seek. At a younger age they will most likely jump out of hiding before being found, as though the distinction between hider and seeker is blurred. By age 2, however, waiting to be found may still be hard, but at least they run in the opposite direction when the seeker comes near. They recognize the separateness of people's roles and intentions.[18]

As understanding of the self develops, so do the structures for the regulation of action that we think of as agency:

> During the toddler period the child not only appraises and responds to events in context (including the context of feelings), but now also evaluates his or her own behavior in relation to standards—at first external but ultimately (by the pre-school period) internal standards.[19]

Again, the logic of structural development is the same as in the infant. The difference is that the neonate was struggling to develop a model for hand

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[18] L. Alan Sroufe, *Emotional Development*, p. 197. References included in the text have been omitted.

movement while the toddler now has an internal model of "herself as agent" which day-in day-out she observes in interaction with others. She observes judgments about actions and—if those judgments matter—learns their pattern. Finally, with guidance, the interpersonal once again becomes intra-personal, and the cycle of development begins anew with yet higher order structural components.

The beginning of moral autonomy concludes this brief survey of the construction of the self out of neurological and environmental components. The research on the topic is extensive and fascinating, yet the discussions of the self in the humanities rarely touch upon this material.

Self and Embodied Meaning

The world as we see it is a reconstruction of the coarse-coded feature analyses offered by the visual cortex in its constant conversation with higher order selection biases and with thalamic filtering functions. The meanings we read into this reconstructed world are syntheses of the coarse-coded valences of sensory input structured through semantic memory in concert with current interpretive biases (moods, expectations, fears, etc.). And "we" who shift gaze, evaluate, and act are stable patterns of evaluation and action within semantic memory. These cortical systems—structure upon structure—are not simple; indeed they are as complex and shaded as the human experience they make possible. The self that lives within the matrices of memory is not radically different from the structures that shaped it. It

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[19] L. Alan Sroufe, *Emotional Development*, p. 193.

is not free and self-determining, but it also is not pragmatically deterministic. We cannot master the history that shaped us; we cannot predict the limits of the possibilities before us. Nonetheless, drawing lines of causality between the world of experience, a body into which we are born, and a self that emerges from their midst changes our understanding of that self and of the inwardness that is its subjective experience. Embodied subjectivity is as objective and substantial as the body and the world, no more and no less.

Affect, as the core manifestation of subjectivity, is also transformed: it speaks of history and the body. Researchers increasingly have acknowledged the cognitive, creaturely logic of affect. When affect is seen as serving a cognitive function, however, the usual distinction between cognition and emotion blur. And indeed this blurring finds empirical corroboration: researchers in infant development have come to realize that the distinction between affective and conceptual structures misses the point. Contemporary approaches see affect as precisely the way evaluative information about the world is captured and represented:

> In recent years, the field of emotion theory has moved away from the earlier emphasis on accounting for emotional experience, towards a focus on emotional information processing. This provides the needed perspective concerning the intrinsic integration of emotion with cognitive functions. Many researchers today define emotions as essentially adaptive, motivational mechanisms, which interact with or are aspects of

> cognition.[20]

In the specific context of very early development, the causal link between affect and cognition becomes even closer:

> Possible roles for affect in infancy have centered on affect as the infant's primary medium of communication and meaning and as the basis for early concept formation. Kellerman takes the position that "concept formation exists at first as affective tonal representation. This idea is an oblique reference to the proposition that cognition is derived from uncrystallized affect; that is, thought is the consolidation in language of a feeling, mood, or cluster of emotions."[21]

L. Alan Sroufe illustrates the affectively structured, inchoate nature of early conceptual evaluation:

> The infant's evaluation of an unfamiliar event in its context is not a cold calculation concerning possibilities and probabilities. The infant, however sophisticated by 10 to 12 months of age, does not think: "The last time a large man I didn't know came at me some pain resulted. On the other hand, that wasn't at home, and mother was holding me tensely, as though she herself had a sense of foreboding." The infant does not even simply think "this is safe" or "this is dangerous." Rather, he or she *feels* safe or apprehensive. These feelings, which are central to evaluation, depend both on current circumstances (familiarity of the setting, presence and accessibility of caregiver) and on general as well as specific experiential history.[22]

Sroufe suggests a unity of the affective and the conceptual at the structural as well as phenomenological level:

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[20] Wilma Bucci, *Psychoanalysis and Cognitive Science: a Multiple Code Theory* (New York: The Guilford Press, 1997), p. 128.

[21] L. Alan Sroufe, *Emotional Development*, p. 128.

> The remarkable development of memory between 3 and 10 months has dramatic consequences for emotional development. Memory development is the foundation for anticipation. In addition, it is the basis for an emotional differentiation of mental images. There is no longer a single class of cognitive schemes; rather, such schemes are categorized and may be affectively toned. Mental images by this age may carry with them (as part of them) an associated negative or positive affect.[23]

As argued in Chapter Four, since the mental images themselves derive from bottom-up feature structuring, the multimodal semantic map that binds these images together organizes itself according to the most salient common patterns underlying the data, that is, the patterns of affective arousal. Exactly when the prefrontal structures needed for complex integrations become available is unclear, but by 10 months, the inhibitory circuits, processing space, and memory structure itself becomes mature enough for observers to clearly discern the gross affective judgments of "positive" or "negative.

While the coding that represents many objects in the affect-space of semantic memory may drift towards shades of gray with increased experience, the logic of specifically affective structuring remains central to those patterns that embody the self:

> The attachment system, according to Bowlby, is continually active. Monitoring the accessibility of the attachment figure occurs, even without awareness, according to what are conceptualized as "working models of attachment." Such models are expectation sets that include representations of self in relation to other and they are linked by affect that may be ... self

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[22] L. Alan Sroufe, *Emotional Development*, pp. 138-39. Emphasis in the original.

[23] L. Alan Sroufe, *Emotional Development*, p. 153.

> enhancing (as in secure attachment) or self-maintaining/defensive (as in insecure attachment.)[24]

Robert N. Emde cites the work of Wilma Bucci in describing how affective codings develop to represent the central experiences that define the self in relational terms:

> For Bucci, emotional schemas begin to develop in non-verbal form, including sub-symbolic processes (sensory, visceral, and kinaesthetic sensations modeled by parallel distributed processing systems) as well as symbolic imagery; later, linguistic components are incorporated. Emotion schemas are prototypic representations of the self in relation to others built up through repetitions of episodes with shared affective states.[25]

Emde, a psychoanalyst, has proposed the idea of an "affective core" to the self as precisely the structure that the psychoanalytic session must reach and affect. He sees Bucci's model of emotional schemas developed early in childhood as one way of explaining the difficulty of restructuring dysfunctional self systems:

> [E]motion schemas of self in relation to other may be more resistant to change over the course of development than other prototypic [cognitive] schemas because of the strong influence of sub-symbolic input in the early linkages with interpersonal experience. Thus for Bucci, such schemas become the basis for the organization of self and for transference.[26]

The self structures its engagement in the world through a system of patterns that are both cognitive and affective and to which the self is fundamentally committed

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[24] Robert N. Emde, "Moving Ahead: Integrating Influences of Affective Processes for Development and for Psychoanalysis." *International Journal of Psychoanalysis* (1999) 80:327.

[25] Robert N. Emde, "Moving Ahead," p. 328. The remarkable conceptual overlap with Damasio—who approaches the issues from very different disciplinary commitments—points to the emergence of an important intellectual synthesis.

as an account of how the world is. The self, the world, the cognitive, and the affective all are mutually implicated, indeed mutually structuring, in the matrices of meaning created through developmental dynamics.

In our everyday lives, the deep affective commitments underlying experience rarely come to the fore. The structures of meaning ramify so complexly that the large-scale organization is hard to see. Yet our emotional commitments, large and small, speak to the entire history of our engagement with the world.[27] They have a substance we tend to ignore. When I teach Chinese poetry, I have a difficult time persuading students to use their own particular responses as tools to help to interpret the poems. They have long been taught that their subjective responses are not part of the same world as the texts they read. This reluctance to look within produces a double alienation: first, they sense that the meaning of the text *for them* is locked in a private discourse outside of what the poem might "really mean." Secondly, because they believe their responses are arbitrary, the internal patterns that shape their engagement with the world never merit further thought. This is what they feel, and that is that. There is no sense that there is a logic or history to this inwardness: the students' belief in the arbitrariness of subjectivity cuts them off from their own past and from each other. This view of emotions as private produces an odd ambivalence in our society. Emotions demonstrate that there

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[26] Robert N. Emde, "Moving Ahead," p. 328.

[27] This connection in fact is the standard assumption throughout the Chinese poetic tradition.

actually *is* a private self capable of spontaneous action, but this self in its very freedom is cut off from the world of experience that threatens to impinge on it.

This quandary about the status of experience reflects another dichotomy in Western thought—essence and accident—that does not work well in the neurobiological context. If the self must be an *essential* self that remains after all experiential accretions are stripped away, it inevitably fades away into a transcendental postulate, a formal requirement to ground the possibility of experience. This self will not be found *within* the phenomenal world of historical process. This issue brings us up against the limits of the empirical. There may be an essential metaphysical self that may serve as the final or formal cause shaping the neuronal nexus that is the cortical self. These aspects of causality may be central to any final account of the self, but they are beyond the scope of this book. More importantly, our habits of thinking about such categories as freedom, identity, and authenticity always direct our gaze and reflection away from the boundedness of a biologically embodied self. Looking for how the metaphysical might inform the phenomenal asks questions of the world of experience that it cannot answer and neglects the powerful yet limited question, "How then does it work here, now?" Committing oneself to remaining within the bounds of the phenomenal cuts short the quest for ultimate answers, but it restores to us our intimate connection with the human world, the world as accessible through our capacity for experience.[28] In

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[28] Paul Guyer makes this point in the context of Kant's *Critique of Judgment* and the human experience of freedom. See Paul Guyer, *Kant and the Experience of Freedom* (Cambridge: Cambridge University Press, 1993), pp. 229-230.

this context, the neuroscientific model for cortical development gives us an account of the empirical structure both of our selves and of our experience of the world. Each self is a unique sedimentation of history embodying an irreproducible particularity. We have no choice but to experience the world through the mediation of sensory and cortical structures, but the world (by postulate) constantly pushes and shapes these structures: they belong to the world just as we do.

Focusing on the cortical developmental processes that create the empirical self does not eliminate all the classical philosophical problems, but it does reshape what can be called local knowledge, knowledge about our own position within the nexus of historical processes and biological causality. For example, we are no closer now to a theory of reference in epistemology than we ever have been, but we can give an account of the rise of semantic structures in the cortex. We may not know what a poems MEANS in some odd absolute sense, the very shadow of which reduces my students to stunned blankness, but we can reflect on the proximal processes of meaning. So students learning to read Chinese poetry learn to draw on the patterns of their own experience and attempt to imagine a writer long ago and far away—growing up in his (mostly his rather than her) own historical context—who ordered language in this way for some purpose. That purpose may have involved duplicity or self-mystification; our own readings may involve the same. There are no sure bets here, just patterns and probabilities. The point is, however, that precisely the recognition of these probabilistic patterns constitutes knowledge within the human world.