

CHILD **MARTIN J. PACKER** DEVELOPMENT

UNDERSTANDING A CULTURAL PERSPECTIVE



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CHAPTER 5

INFANCY

(6 WEEKS–12 MONTHS)

A PRACTICAL UNDERSTANDING OF THE WORLD



[I]t was the lengthening of infancy which ages ago gradually converted our forefathers from brute creatures into human creatures. It is babyhood that has made man what he is. The simple unaided operation of natural selection could never have resulted in the origination of the human race ... In order to bring about that wonderful event, the Creation of Man, natural selection had to call in the aid of other agencies, and the chief of these agencies was the gradual lengthening of babyhood. (Fiske, 1909[1871], p. 1)

LEARNING OBJECTIVES

In this chapter we will look at the first stage of human development, infancy. We will consider:

- Piaget's account of how the infant develops a practical understanding of the world through active exploration.
- The world of infancy, based primarily on investigations of the way infants respond not to objects but to other people.
- The concerns of caretakers of the human infant.

In studying these aspects of infancy you will come to understand the particular way the human infant lives in the world, and how caregivers must respond to her needs.

FRAMING QUESTIONS

- In what sense might this statement be true? "It is babyhood that has made man what he is." Think about possible evidence in favor of this view, and against it.
- Do you consider that caring for an infant is something that comes naturally to parents and other caregivers? In your opinion, is the biological mother of an infant the best caregiver? If so, why?
- If you had just become a parent, what material preparations would you be making?

INTRODUCTION

The human newborn leaves the womb and enters an environment that has been shaped and worked over by previous generations of her community, as we saw in Chapter 3. She has inherited the genetic information

needed to grow a skilled, agile, relatively graceful body with a big brain and a large cortex. She has also inherited the artifacts created by her predecessors in her community, which are being used in such a manner as to meet her present and future needs. However, she herself has yet to acquire the ability to employ these artifacts appropriately. We saw in the previous chapter that the human newborn leaves the womb completely dependent on other people, and at the same time sensitively attuned to them: to their faces and voices, for example. She is relatively immature compared with the young of other species, and she will take a comparatively long time to grow to adulthood.

Infancy—from a Latin word meaning one who does not speak—is widely, though not universally, considered a distinct stage of development that extends from birth until approximately 1 year of age. In some cultures, and in some psychological theories of development (such as Piaget’s), infancy is considered to extend to 2.5 years of age, but I will be describing a transition that occurs towards the end of the first year of life, when the infant begins to walk and talk, as the end of this first developmental stage.

The proposal that the immaturity and duration of infancy are related to the qualitative difference between humans and other animals has been around for a long time. For example, the American philosopher John Fiske (1842–1901), whom Charles Darwin called a lucid expositor and thinker about evolution, made precisely this proposal in 1871. Human evolution has arranged human infancy, said Fiske, so that the child is “born with the germs of many complex capacities which were reserved to be unfolded and enhanced or checked and stifled by the incidents of personal experience in each individual.” He went on to explain, “It is not that our inherited tendencies and aptitudes are not still the main thing. It is only that we have at last acquired great power to modify them by training, so that progress may go on with ever-increasing sureness and rapidity.”

If Fiske was right, we would expect to see during infancy, during the first year of life, important changes as the newborn’s capacities start to be “unfolded and enhanced, or checked and stifled.” We ought to find important learning taking place during infancy.

And indeed we do. It has been recognized for some time that infancy is a time for learning about the immediate environment in a direct, practical manner. How, though, should we conceptualize the practical understanding which the infant acquires? In this chapter I shall examine several different conceptualizations.

My conclusion will be that the kind of understanding that an infant acquires is practical, intuitive, emotional, and social all at once. This is an age, and a developmental stage, at which there is as yet no clear differentiation between the social and the intellectual, between the cognitive and the emotional, between physical movement and intelligent action. The infant is interacting with the world around her in terms of a simple kind of interpretation, understanding the world in terms of its contingencies.

1. THE INFANT’S PRACTICAL UNDERSTANDING

For a long time, psychologists have recognized that an infant rapidly acquires a practical understanding of her surroundings. One of the key figures in the study of infancy was Jean Piaget, who we met in Chapter 2. Piaget proposed that infancy is the stage of **sensory-motor intelligence**. In this section I will review Piaget’s account of the first four substages of sensory-motor intelligence, and then discuss what is known as the **A-not-B error**. I will compare Piaget’s account with two other competing views of how an infant understands the world: theory theory and dynamic field theory.

1.1 THE EARLY SUBSTAGES OF SENSORIMOTOR INTELLIGENCE

Piaget's developmental theory provides an important perspective on the abilities of the human infant. Piaget viewed the first two and a half years of the child's life as the period of sensorimotor intelligence, because the process of adaptation during this period involves coordinating sensory perceptions with motor actions in increasingly complex ways (we discussed Piaget's concept of psychological **adaptation**, and its two component processes, **assimilation** and **accommodation**, in Chapter 2). Piaget argued that infants do not experience the world the way adults do: they have to construct an understanding of the reality that adults take for granted. Piaget's two great books on infancy—*The Origins of Intelligence* (1936) and *The Child's Construction of Reality* (1937)—describe how the infant, and then the toddler, constructs successively more complex practical **schemas**, which amount to a practical understanding of space, time, causality, and objects. "Schema" is Piaget's term for an enduring psychological structure: in the sensorimotor period the schemas are patterns of practical activity. Schemas provide the "forms" or "categories" that the influential philosopher Immanuel Kant argued are innate and universal and imposed by each person on the raw data of experience. Piaget believed that the forms of space, time, causality, and object are not innate, and that it takes an infant two or three years to construct them.

Piaget described *six substages* to the sensorimotor period. In *The Origins of Intelligence* he described the schemas that characterize each substage. The first schemas are simple *reflexes*, though Piaget insisted that even reflexes are active responses by the newborn, not just passive reactions to external stimulation. Reflexes become *circular reactions*, and these then become more complex, organized, and differentiated. A **circular reaction** occurs when the infant repeatedly tries out an action with some particular object, learns how to control its action in that context, and then works to generalize it to other contexts. You will see that it is a similar idea to the perception–action cycle we discussed in Chapter 4. Piaget distinguished among **primary circular reactions**, **secondary circular reactions**, and **tertiary circular reactions**.

In *The Child's Construction of Reality* Piaget described the substages again but this time in terms of the different ways the infant experiences the world. For example, it is not until substage 6 that the child understands that objects exist in their own right, independent of her perception of them and her action on them. This **object permanence** has become a focus of much subsequent research.

In the earlier substages, space, time and object are not yet differentiated. Well-known phenomena such as the "A-not-B error" (see below) illustrate how around 8 to 12 months of age objects have their special places for the infant, and are understood as linked to the actions that have been carried out on them.

In sum, Piaget proposed that our human understanding of space and time, of objects, and of causality, is not innate, that it has to be constructed over the course of our development. In his account, the human baby is doing something quite amazing in the first two years of life: constructing a practical understanding of the basic aspects of what humans take to be reality. She constructs this understanding through her practical activity, by exploring the environment with her body. This is "the construction of reality in the child," to which the title of Piaget's book refers. Confusingly, most textbooks focus on only a single aspect of sensorimotor intelligence, that of object permanence. This is certainly important, but to understand it correctly we need to place it in the overall picture that Piaget painted of the sensorimotor period.

Piaget's sensorimotor period corresponds to what I am calling in this book both *infancy* and *toddlerhood*. In this section I will focus on the four substages that occur during the first year of life. In Chapter 5 I will describe the last two substages, which occur during the toddler stage.

1.1.1 SUBSTAGES 1 TO 4 OF SENSORIMOTOR INTELLIGENCE

Piaget's account of sensorimotor development was based on his observations of his own children: Laurent, Lucienne, and Jacqueline. I have illustrated each substage with one of his observations. (Piaget's convention for representing the child's age is "year; month (day)," for example, "0;8(20)" is zero years, eight months and 20 days of age.)

Substage 1: Reflex Schemas (Birth to 1 month). From birth to around 4 or 5 weeks of age the infant is learning to control and combine the reflexes with which she was born. The sucking reflex, for example, is an innate reflex response to stimulation of the lips or cheek that functions to obtain food, but it will also be applied by accident to non-nutritive objects such as the infant's thumb. The *assimilation* of this reflex is seen in the fact that for an infant in this substage everything is a "suckable": the familiar sucking reflex is applied to every new object. These early reflexes do not permit much *accommodation*, but they produce stimulation that leads to further development. In this substage the infant does not search for objects that have been removed from sight. Apparently, out of sight is out of mind: the infant shows no expectation that objects will continue to exist when they are no longer visible.

Observation 1.— From birth sucking-like movements may be observed: impulsive movement and protrusion of the lips accompanied by displacements of the tongue, while the arms engage in unruly and more or less rhythmical gestures and the head moves laterally, etc.

As soon as the hands rub the lips the sucking reflex is released. The child sucks his fingers for a moment but of course does not know either how to keep them in his mouth or pursue them with his lips. Lucienne and Laurent, a quarter of an hour and a half hour after birth, respectively, had already sucked their hand like this: Lucienne, whose hand had been immobilized due to its position, sucked her fingers for more than ten minutes. (Piaget, 1952a[1936], p. 25)

Substage 2: The first acquired adaptations and the primary circular reactions (1 to 4 months). Starting around 4 weeks of age the infant begins to apply her simple reflexes and action patterns to new objects in a systematic way. Whereas in substage 1 the infant might accidentally suck on her thumb, now she will actively bring the thumb to her mouth in order to suck it. Piaget interpreted this as a repeating of pleasurable actions. He called such action patterns **primary circular reactions**; they are *circular* in the sense that the infant repeats them; they are *primary* in the sense that they don't extend into the world beyond the infant's own body.

Observation 11.— Laurent at 0;0(30) stays awake without crying, gazing ahead with wide open eyes. He makes sucking-like movements almost continually, opening and closing his mouth in slow rhythm, his tongue constantly moving. At certain moments his tongue, instead of remaining inside his lips, licks the lower lip; the sucking recommences with renewed ardor.

Two interpretations are possible. Either at such times there is searching for food and then the protrusion of the tongue is merely a reflex inherent in the mechanism of sucking and swallowing, or else this marks the beginning of circular reaction. It seems, for the time being, that both are present. Sometimes protrusion of the tongue is accompanied by disordered movements of the

arms and leads to impatience and anger. In such a case there is obviously a seeking to suck, and disappointment. Sometimes, on the other hand, protrusion of the tongue is accompanied by slow, rhythmical movements of the arms and an expression of contentment. In this case the tongue comes into play through circular reaction. (Piaget, 1952a[1936], p. 50)

These simple circular reactions are subsequently *differentiated* and *integrated*. The infant will learn to suck in different ways on different objects, and to combine action patterns in various ways. The schemas become more complex, and the infant's understanding of the world develops. Piaget insisted that an infant is active, seeking stimulation, and actively solving the problems that confront her in her environment.

Substage 3: Secondary circular reactions and procedures to make interesting sights last (4 to 8 months). Between 4 and 8 months of age the infant shows growing interest in the environment around her. Now she repeats interesting and pleasurable actions not only on her own body, but also on things out in the environment. Piaget called these action patterns **secondary circular reactions**. For example, if we place a brightly colored rattle in the hand of a 7-month-old infant she will grasp it, move it, perhaps look startled at the noise it makes, and begin to wave it more systematically, while watching it intently. Piaget believed that this behavior was evidence for the infant's growing understanding that objects are distinct from her body.

Observation 94.— At 0;3(5) Lucienne shakes her bassinet by moving her legs violently (bending and unbending them, etc.), which makes the cloth dolls swing from the hood. Lucienne looks at them, smiling, and recommences at once. These movements are simply the concomitants of joy. When she experiences great pleasure Lucienne externalizes it in a total reaction including leg movements. As she often smiles at her knick-knacks she caused them to swing. But does she keep this up through consciously coordinated circular reaction or is it pleasure constantly springing up again that explains her behavior?

That evening, when Lucienne is quiet, I gently swing her dolls. The morning's reaction starts up again, but both interpretations remain possible.

The next day, at 0;3(6) I present the dolls: Lucienne immediately moves, shakes her legs, but this time without smiling. Her interest is intense and sustained and there also seems to be an intentional circular reaction. (Piaget, 1952a[1936], pp. 157–158)

Substage 4: Coordination of secondary circular reactions and their application to new situations (8 to 12 months). Starting around 8 months of age the infant begins to coordinate these secondary circular reactions; that is, to put them together into more complex action sequences. For example, the infant may reach out and drop an object in a cup, then pick up the cup. She may reach out to pick up a cover, then snatch an object that has been uncovered. In these **coordinated secondary circular reactions** we see behavior that is organized and directed towards a goal. Schemas have become coordinated so that the first schema serves as a means and the second schema defines the goal. Piaget considered this stage to show the earliest form of intentional action and problem-solving ability. At this age, moreover, the infant begins responding to objects and people when they are out of sight. After she has seen an object being hidden, she will lift the cover to retrieve it.

Observation 121.— [...] At 0;8(20) Jacqueline tries to grasp a cigarette case which I present to her. I then slide it between the crossed strings which attach her dolls to the hood. She tries to reach it directly. Not succeeding, she immediately looks for the strings which are not in her hands and of which she only saw the part in which the cigarette case is entangled. She looks in front of her, grasps the strings, pulls and shakes them, etc. The cigarette case then falls and she grasps it.

Second experiment: same reactions, but without first trying to grasp the object directly. (Piaget, 1952a[1936], p. 215)

Piaget believed that these early and simple sensory-motor schemas contain what he called a “practical logic”: an organization analogous to what in mathematics is called a “group.” A group is a system of elements and operations with four fundamental properties. The first property is that the group is **closed**—an operation on any element in the group yields another element, but one which is still a member of the group. Second, a group shows **associativity**—if P, Q and R are operations, the order of the operations is not important: $(P \times Q) \times R$ is equivalent to $P \times (Q \times R)$; that is, “the end result is independent of the route taken” (Piaget, 1970, p. 20). Third, there is an **identity** operation, which leaves an element unchanged, identical to itself—an operation I such that $P \times I = P$. Finally, the group shows **reversibility**—for every operation P there is an operation P’ that reverses it, such that $P \times P' = I$.

To put this in simpler terms, the infant discovers in her everyday actions that she can (1) act on things without changing them, (2) follow various routes to the same goal, (3) not act, and (4) return to her starting point.

These are fundamental properties for any logical system, and Piaget insisted that they exist in the infant’s actions. He proposed that at first these practical groups exist only from an observer’s viewpoint, but with the passage of time the infant comes to recognize them herself, and this provides the basis for her logical thinking when she is older. We can see here Piaget’s interest in how the infant—who I think he would have called a biological organism—becomes an adult who is logical—able to understand and follow the laws of logical reasoning. For Piaget, adult logic is inherent in the child’s physical activity in the world. As she develops, she becomes consciously aware of this logical potential.

Infancy 0–12 months	Sensory-motor stage	Substage 1: Reflex Schemas (Birth to 1 month)
Toddler 1–2.5 years	Sensory-motor stage	Substage 2: Primary circular reactions (1 to 4 months)
Early childhood 2.5–6 years	Preoperational stage	Substage 3: Secondary circular reactions (4 to 8 months)
Middle childhood 6–12 years	Concrete operational stage	Substage 4: Coordination of secondary circular reactions (8 to 12 months)
Adolescence 12–	Formal operational stage	

Figure 5.1 The first four substages of sensory-motor intelligence, according to Piaget

1.1.2 THE A-NOT-B ERROR

The character of an infant's understanding of the physical objects in her environment was assessed by Piaget in a number of ways. One task that has attracted a great deal of attention involved simply hiding an object the infant was interested in and observing her response.

A newborn, in substage 1, will not respond at all when an object in her line of sight is hidden. In substage 2, when an object is hidden the infant will orient (turn her eyes and head) to the place where it was last seen. In substage 3, the infant will reach for a partially hidden object but will stop if the object disappears completely (see Table 5.1).

However, around the end of infancy, in Piaget's substage 4, at 8 to 12 months of age (the substage of Coordinated Secondary Circular Reactions), the infant shows a surprising response. She will search for an object that has been completely hidden, which suggests that she understands that objects continue to exist when they are not directly visible. However, the infant at this age makes an interesting "error" which suggests that she does *not* yet understand objects the way adults do. At this substage, when the infant searches for a completely hidden object she looks in the *original* location of the object even when it has been moved to another location in full view. This is called the **A-not-B error**.

Sensorimotor Substage	Response to Hidden Object
Substage 1 Reflex Schemas Involuntary rooting, sucking, grasping, looking	Infant does not search for objects that have been removed from sight.
Substage 2 Primary Circular Reactions Repetition of pleasurable actions, on or near the body	Infant orients to the place where an object was last seen.
Substage 3 Secondary Circular Reactions Repetition of actions that produce interesting change in the environment; dawning awareness of the effects of one's own acts	Infant orients to the place where an object was last seen. Search for objects that are partially hidden.
Substage 4 Coordinated Secondary Circular Reactions Combining schemas as means to achieve a desired end; earliest form of problem solving	Infant will search for a completely hidden object; keeps searching in the original location of the object even if it is moved to another location in full view of the infant—but makes the A-not-B error
Substage 5 Tertiary Circular Reactions Deliberate variation of problem-solving activity; experimentation to discover consequences	Infant will search for an object after seeing it moved, but not if it is moved while out of sight
Substage 6 Inventions Through Sudden Comprehension Invention of new means of problem solving through insight and imagery	Infant will search systematically for a hidden object, apparently certain that it exists somewhere. Shows the ability to follow invisible displacements of an object

Figure 5.2 Piaget's six substages of sensorimotor intelligence, and the typical responses to a hidden object

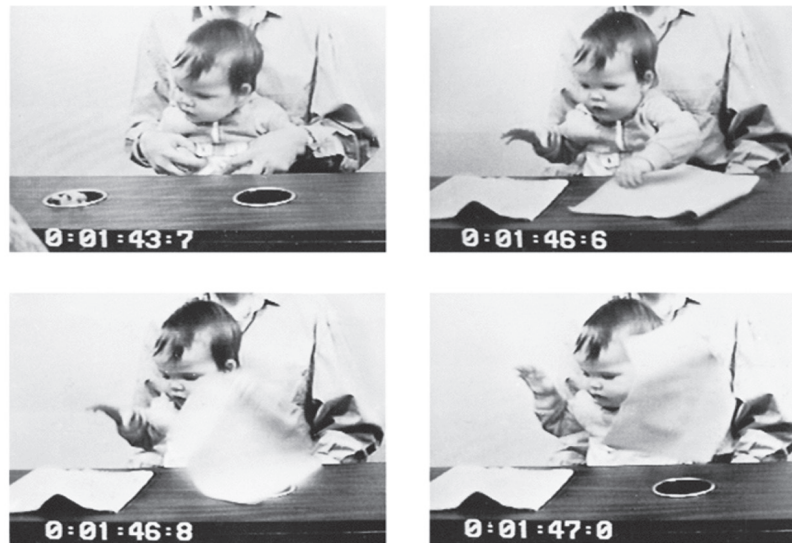


Figure 5.3 The A-not-B error

In a typical administration of what has become a very popular Piagetian task, an infant is seated at a table on which two small cloths have been placed, one of them at the location we will call A, the other at location B. An object—usually a small toy—is placed at location A, and when the infant’s attention is focused on it, it is covered with the cloth. The infant in substage 4 usually has no difficulty reaching out to grasp and remove the cloth, and then retrieve the object. The researcher hides the object again two or three more times. Then the object is moved to location B, and hidden there.

This time, what usually happens is that the infant reaches out and picks up not cloth B, as one would expect, but cloth A. This “A-not-B” behavior is an “error” from an adult’s point of view, but Piaget argued that the behavior must make sense for the infant.

Of course, we could say that the infant “lacks object permanence,” but what does this phrase really mean? Many textbooks leave out Piaget’s own explanation of the infant’s behavior when she makes the A-not-B error. Here is what Piaget wrote:

The object is still not to the child as it is to us: a substantial body, individualized and displaced in space without depending on the action context in which it is inserted ... Hence there would not be one chain, one doll, one watch, one ball, etc., individualized, permanent, and independent of the child’s activity, that is, of the special positions in which that activity takes place or has taken place, but there would still exist only images such as ‘ball-under-the armchair,’ ‘doll-attached-to-the hammock,’ ‘watch-under-a-cushion,’ ‘papa-at-his-window’ etc. ... Whereas we think of the ball as able to occupy an infinitude of different positions, which enables us to abstract it from all of them at once, the child endows it with only a few special positions without being able, consequently, to consider it as entirely independent of them. (Piaget, 1954[1937], p. 62)

Piaget's explanation, then, was that the original location where the object was hidden, location A, has become that object's "special position." Furthermore, to the infant, lifting cloth A is an action that has brought back the object successfully in the past, so it is sensible to perform this action again, even though the object was hidden in a new location. For the infant in substage 4, object-action-place are not yet differentiated, as they will be by the end of the sensorimotor period. She does not yet understand that every object is an individual entity, independent of other objects, and permanent even when it is acted upon or moved. The infant's practical understanding of objects, and also of space, time, and causality, is by no means complete.

1.2 COGNITIVE DEVELOPMENTAL RESEARCH WITH INFANTS AND THEORY THEORY

The phenomenon of the A-not-B error has become something of a testing ground for competing theoretical frameworks. Piaget's constructivism, cognitive developmental psychology, and cultural developmental psychology each have a different view of what is going on during infancy, and consequently they have different interpretations of the A-not-B error.

Cognitive developmental researchers have suggested, for example, that the young infant *does* in fact know that the object continues to exist in location B but cannot *display* her knowledge. Researchers have invented new tasks that can be used with infants who are too young to reach out and pick up a cover. In a typical **visual preference task** the infant is seated in front of a display in which an object moves behind a screen and the direction in which she looks is monitored and recorded. In such a task the infant does not have to reach for the hidden object, she merely has to look in the direction where she expects it to be, and the researchers assume she will look longer when she sees something unexpected. Researchers find that even young infants are surprised when a hidden object does not reappear again (Baillargeon, 2004).

Researchers using this task hypothesize that young infants learn about the role of factors such as height and transparency separately for each kind of event that is shown to them (events such as covering, containment, or occlusion). For example, infants younger than about 7 months are not surprised when a tall object seems to be hidden inside a short container.

Other cognitive developmental researchers have varied other details of the task to see how the infant responds. For example, if the infant is allowed to respond immediately when the object is hidden she may correctly search in location B. If her response is delayed, however, she will shift back to location A (Diamond, 1985). This suggests that her *understanding* of what has occurred is quite sophisticated, but her *memory* of what has occurred is not very good.

Cognitive developmental researchers have concluded that "from an early age infants interpret physical events in accord with general principles of *continuity* (objects exist continuously in time and space) and *solidity* (for two objects to each exist continuously, the two cannot exist at the same time in the same space)" (Baillargeon, 2004, pp. 393–395). Some of these researchers believe that these general principles may in fact be innate. This is very different from Piaget's view that it takes two years for the infant to construct an understanding of spatial continuity and physical solidity.

It certainly seems that young infants quickly develop expectations about the ways physical objects will and will not behave. By five months of age, infants expect that an occluded object will reappear, and

that objects will not occupy the same location in space. It takes more time, though, for them to understand more complex transformations and displacements.

However, what is the nature of these “expectations”? Here is where perspectives diverge. Piaget proposed that infants and toddlers cannot form **mental representations** until they are 20 or perhaps 30 months old. In his view, as we have seen, sensorimotor understanding is a practical, embodied way of knowing the world, *knowing-how* rather than *knowing-that*. Sensorimotor intelligence is non-representational: indeed, for Piaget the infant’s inadequate understanding of the permanence of objects is in part due to her lack of an ability to create mental representations of the objects she sees around her. As we will discuss in Chapter 7, Piaget argued that the ability to create mental representations emerges only at the end of the sensorimotor period, at around 2.5 years of age. Only at that point can the toddler construct what Piaget called an “object concept,” with which she can represent objects even when she no longer sees them. In Piaget’s view, as we shall see, such early concepts may be very simple but they provide the child with a new way of understanding the world that he considered to be a dramatic advance upon sensorimotor understanding.

However, Piaget’s claim that mental representation is not possible until 2.5 years of age runs counter to the central presumption of the cognitive developmental theoretical framework, which, as we saw in Chapters 3 and 4, is that the brain is like a computer. Infancy researchers who work within the cognitive developmental framework assume, then, that even the youngest infants already have mental representations—“concepts”—of the world around them. Some argue that these concepts are innate. As the information included in these representations becomes richer, the infant’s expectations change. The figure below shows one attempt to model the infant’s understanding of physical objects as a process of building cognitive representations.

In fact, some infancy researchers claim that the youngest infants are forming “theories” about the world. This view has been called **theory theory** (Gopnik, 2012; Gopnik & Wellman, 1992). These psychologists have a theory that the infant knows the world by forming theories about it. They explicitly propose that evolution has equipped the human baby with the ability to create and manipulate rules and representations with a structure and a function just like scientific theories, and just like computer programs. They propose that a child’s cognition develops in the way that theories develop

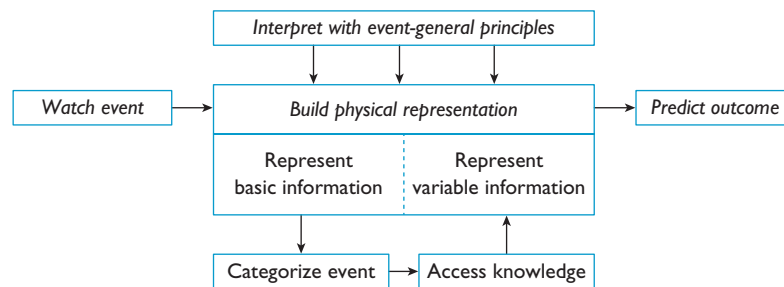


Figure 5.4 One proposal for the kind of mental representation that an infant may construct

Source: Baillargeon (2004)

in science: the infant tests and revises her theory about the properties of objects by making predictions of what will and will not happen.

For example, when an infant shows that she expects an object to reappear after it is hidden, this is because she has constructed an enduring theory of that object. A typical conclusion is that “young infants’ understanding of occlusion events is strikingly similar to that of adults” (Baillargeon, 1993, p. 266).

To a cultural psychologist, however, it appears that these researchers are ignoring an important distinction between two kinds of knowledge. Cognitive developmental researchers assume that the only possible kind of knowledge is representational. Any evidence of an infant understanding something about the world is interpreted by these researchers as evidence for representational knowledge, in the form of “concepts,” “models,” or “theories.” Cultural psychology, on the other hand, follows Piaget in interpreting the knowledge that is formed in infancy as practical, embodied know-how. Cultural psychology differs from Piaget, however, in two important respects. First, it sees this knowledge as being thoroughly social in character. Second, it considers this kind of knowledge to remain important throughout life, whereas Piaget thought that sensorimotor intelligence was replaced by intellectual and representational ways of knowing. I will expand on the first of these points in the next major section of this chapter. First, however, I want to introduce exciting new research on infancy which explores the notion that the understanding of physical objects does not require mental representations.

1.3 DYNAMIC FIELD THEORY

A line of research that has explored in some detail the kind of knowing involved in the A-not-B error is **dynamic field theory** (DFT). Linda Smith, Ester Thelen, and their colleagues have argued that Piaget was correct to see embodied knowledge as central to infancy, but that he was wrong to think it is replaced by a different kind of understanding at 3 years of age (Smith et al., 1999; Thelen et al., 2001).

Where the cognitive developmental psychologists have tried to explain the A-not-B error in terms of the infant’s mental representations and theories, Smith and Thelen have instead explored the possibility of explaining the A-not-B error in terms of the way interconnected neurons handle the continuous flow of information that arrives from the senses. This information, they propose, is reorganized within the brain and then sent to the muscles to initiate action.

Dynamic field theory starts with what we know about how an individual neuron operates and then builds mathematical models of how thousands of interconnected neurons—**neural networks**—would behave. DFT proposes that rather than forming some kind of representation, or theory, or model, a neural network maintains an overall pattern of activation that changes dynamically as new information arrives. The information is distributed across all the neurons in the network, and the properties of the network, operating as a field, lead to the generation of intelligent behavior, in the form of complex, real-time, dynamic responses to the environment.

For DFT, cognition is what takes place when an embodied organism acts within a structured environment. Any organism will actively search for sensory information, its motor activity will be tuned to features of the environment, and its activity will flow seamlessly forward in space and time. Brain, behavior, and environment operate together, and we misunderstand the development of cognition if we

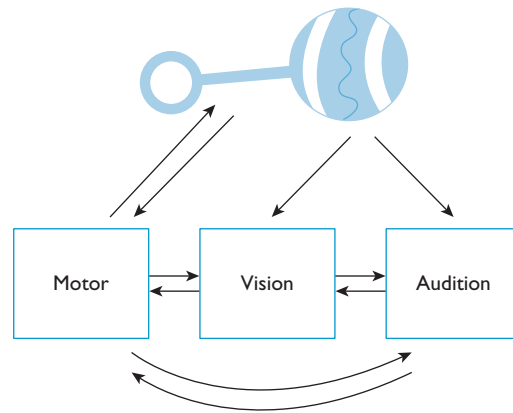


Figure 5.5 The auditory, visual, and motor systems are all activated by shaking a rattle

take the infant—either literally or theoretically—out of her environment. Thelen and Smith argue not only that cognition has sensory-motor origins, as Piaget recognized, but also that cognition continues to have a sensorimotor basis throughout development, a non-representational basis upon which more complex kinds of knowing can be built. As you can see, this is consistent with the new view of brain function that I introduced in Chapter 4.

The research conducted by Smith and her colleagues provides a compelling explanation of the A-not-B error (and of other infant behaviors) in terms of this dynamic flow of information in neuronal fields. I described earlier the secondary circular reaction that occurs when we place a brightly colored rattle in the hand of an infant between 6 and 10 months of age. She will grasp it, wave it, listen to the noise, and then move it more systematically, watching intently. The infant's auditory, visual, and motor systems are all operating and they are functionally interconnected, due to the fact that the rattle moves and shakes and is a bright color. The inputs to the different sensory systems are different, but they are correlated with one another and their mutual dependencies enable patterns to be detected across the sensory modalities.

DFT proposes that when the infant reaches out in the hidden object task, her action is instigated by an integration of visual input in the present and the motor memory of reaching in the past. When she searches in location A, not B, this is because she is responding to the current situation in a continuous, dynamically evolving manner, that depends both on her looking in the present and her memory of what happened (Erlhagen & Schöner, 2002). When the object is first hidden at A, activation rises in the corresponding point in the neural field and continues for a while. As the object is being hidden at B for the first time, there is renewed activation at A due to memory for prior reaches. When the object is hidden, activation rises at B but this fades away and the traces of previous motor actions—reaching for A—dominate the field. This increases the activation at A, leading to reaching for A, and the A-not-B error.

In other words, the A-not-B error occurs because the infant's memory of the desired object is embodied in the processes that plan spatially directed action. It is not a question of forgetting where the object

was hidden: Piaget was right, the object has become bound to a specific location in space. The more immediate memory of the B event competes—within neurophysiological fields in the infant’s brain—with the memory of the previous event, and of prior actions at A, and the latter wins out. Evidence for this is that the error can be made more likely by increasing the salience of A (making it a bright color, for example), and made less likely by increasing the salience of B.

DFT suggests that it is not necessary to postulate that the infant has some kind of internal representation of the objects and events, a “know-that” that amounts to a theory. The A-not-B error arises from the sophisticated practical understanding of the world that the preverbal infant is acquiring. Each neurological field is coupled to the world through the infant’s body, so that the infant’s spatial orientation and posture play an important role in how she understands and responds to events. For instance, if we make the infant stand up between the events at A and the event at B the error disappears, because the memory for A, and the preliminary plan to reach to A, are reset by the change in posture. The infant’s body and the objects and locations of the task together form a practical field within which certain actions become inviting, and in which it makes no sense to distinguish between what the infant perceives and what she “knows.” This is strong evidence that the infant’s understanding is embodied rather than representational.

There are similarities between DFT and the concept of the perception–action cycle that I introduced in Chapter 4. DFT is an account of the infant’s behavior and knowledge of the world in terms of the lower levels of the perception-action hierarchy. It also fits well with what is known as “dual systems theory.”

1.4 DUAL SYSTEMS THEORY

Over the past decade or so, psychologists have become very interested in **dual systems theory**, perhaps because a Nobel Prize was won for the first investigations (Tversky & Kahneman, 1974). There appear to be two distinct modes in adult reasoning and decision making: these have been called **System 1** and **System 2** (De Neys, 2006; Evans, 2008; Lieberman, 2000). System 1 is rapid, intuitive and unconscious: this mode of reasoning involves quick judgments about a situation when there is no time for a careful examination of the facts. System 1 operates automatically and quickly, with no sense of voluntary control.

System 2 includes a lot of different functions, but they all share the characteristic that they require focused attention. This mode of thinking is deliberate, effortful, thoughtful, rational, and relatively slow: it is what we usually think of when we think about thinking. When we carry out System 2 processes we have the subjective experience of agency, choice, and concentration. That is to say, we need to focus on what we wish to accomplish, we have a sense of making an effort, and we know we have various options among which we will deliberately select.

These two systems have also been named to emphasize their central characteristics: System 1 has been called System X because it is “reflexive,” while System 2 has been called System C because it is “Conscious.” An adult tends to think about themselves in terms of the deliberate, conscious system: “When we think of ourselves, we identify with System 2, the conscious, reasoning self that has beliefs, makes choices, and decides what to think about and what to do” (Kahneman, 2011). Indeed, until recently psychology as a whole has tended to focus on, and to value, System 2 (Bargh & Chartrand, 1999). But each

of the two systems serves an important function, and it is necessary that we pay attention to both. Each system has both its strengths and its limitations, and it seems that the relationship between the two systems changes during development. We will be exploring this in the chapters that follow.

A lot of research has focused on the “errors” of System 1. For example, when people make intuitive judgments about their chances of winning the lottery they overemphasize their possible losses, and underestimate likely gains. People tend to misjudge probabilities, and especially combinations of possibilities. For example, when a young person is described as a young female and people are asked a series of questions about her possible occupation they are more likely to affirm that she is “a bank teller and a feminist” than that she is “a bank teller.” But logically the second statement *has* to be more probable, because there are necessarily more bank tellers than there are feminist bank tellers (Kahneman, 2011).

But are these errors? Perhaps practical logic is not the same as formal logic. Presumably the intuitive system wouldn’t exist if it were leading people to frequently make significant mistakes. Perhaps people intuitively assume that the statement that someone is “a bank teller” would include the information that she is “a feminist” because who would leave out something so noteworthy! Another line of research has focused on the *strengths* of intuitive thinking. It turns out, not surprisingly, that experts in a specific activity have become intuitive and automatic in their skills: for example, firefighters become able to make quick, intuitive judgments about danger in a burning building (Klein & Jarosz, 2011). This kind of expertise appears to be in large part a matter of educating System 1. And this means that System 1 is not simply full of biases and errors, it also becomes full of expertise and wisdom.

Neuroscientists have begun to explore the neurological basis for these two systems. Their findings suggest that System 1 involves the lateral temporal cortex, the basal ganglia, and the amygdala. They propose that System 1 is made up of connectionist networks in which information is stored in a widely distributed manner, in synaptic connections and fiber linkages. This system employs parallel functioning: it is performing many simultaneous operations at the same time, finding patterns in sensory input, and assimilating data into valleys of coherence (to talk in systems terms).

Central among these operations is the basic, ongoing perception of the world in which we live. One might say that the fundamental contribution of System 1 is to construct our taken-for-granted world. Each of us experiences a world external to us that we assume without question to be real, with enduring objects that are physical, but also have emotional and meaningful characteristics. On reflection, though, we can see that this experience is a product of our active engagement in the environment, and the brain’s active processing of energy flowing into the senses. The processes of this perception are largely unconscious: our conscious awareness is of the *results* of our unconscious perceptual processes.

System 2, in contrast, handles deliberate controlled psychological functions, and contributes to our *reflective* awareness: our sense of our own agency in the world. System 2 appears to be instantiated in the anterior cingulate, the hippocampus, and the prefrontal cortex.

System 1 is operating smoothly most of the time, but when System 1 encounters some problem or hitch, then we turn to System 2. A problem activates the anterior cingulate, which in turn activates the prefrontal cortex. As we have seen, System 2 involves deliberate and conscious reasoning, and as a consequence it can use symbolic logic to solve problems in a way that System 1 cannot, and System 2 uses this ability to influence or override System 1. It seems that the hippocampus records the occasions in which System 2 was activated, possibly to facilitate problem solving the next time a similar situation is encountered.

System 1	System 2
Unconscious (you know only its products)	Conscious (you also know its operation)
Output is experienced as reality	Output is experienced as self-generated
Fast, automatic	Slow, deliberate
Parallel (many at once)	Serial (one at a time)
Learns slowly	Learns quickly
Intuitive, analogical	Formal, propositional
Phylogenetically older	Phylogenetically newer
Ontogenetically younger	Ontogenetically older

Figure 5.6 System 1 and System 2

Source: Lieberman (2002)

Although most research on System 1 and System 2, both behavioral and neurophysiological, has been conducted with adults, it seems highly likely that in the newborn all brain processes are unconscious and automatic, involving only System 1. I have said that System 1 handles the unconscious processing of sensory input so as to give rise to our experience of a stable world, in which people and objects are solid and enduring, continuing to exist even when out of sight. The sensorimotor period can be viewed as the time when System 1 is learning how to do this work, so that as a result the way the infant experiences the world is continually changing. In this case, the dynamic fields that developmental researchers have been exploring are aspects of System 1.

Only with time, experience and adult help will conscious, controlled psychological functions begin to emerge. In the chapters that follow I will be describing the development of various kinds of self-regulation and self-control: these presumably show the increasing operation of System 2. Interaction with other people will turn out to be crucial for the operation of System 2 (Ardilla, 2008). In fact, during infancy it is the caregivers who provide System 2 for their child. Infant and caregivers together form the dual systems, as we shall see in section 5.

In later chapters we shall see how System 2 both builds upon the basis of System 1 and acts back on System 1 to transform it. The relationship between the two is a dynamic one: System 2 would not be possible without the existence of System 1; on the other hand, System 1 is changed once System 2 emerges. Indeed, if we take seriously the model of the perception–action cycle, there are multiple levels of functioning, not merely two.

We can see in infancy, then, a practical understanding of the world that grows in power and effectiveness. During the first year, the infant becomes capable of simple physical manipulation of physical objects, elementary toys, and apparatus. Using one object to influence another is a fundamental but crucial form of practical intelligence, the basis for tool use (Lockman, 2000), and importantly it is a type

Piaget	Cognitive Developmental Psychology	Dynamic Field Theory	Dual Systems Theory	Cultural Psychology
A practical sensory-motor understanding of the physical world.	Concepts, perhaps theories, about the world.	Neural networks with dynamic activation generate intelligent behavior of an embodied and embedded organism	System 1 operating to experience of a stable world. The caregiver provides System 2.	An understanding of social spaces and times that is practical, intuitive, emotional, and social.

Figure 5.7 How different theoretical frameworks view the type of understanding constructed during the first year of life

of intelligence that is prior to and independent of language. We shall consider in the next chapter the emergence of speech in the first year.

Piaget viewed sensorimotor intelligence as the result of the infant’s interaction with her physical surroundings and adaptation to those surroundings. The infant’s sensorimotor intelligence, then, is her practical understanding of the world around her. It is also her way of *evaluating* things and events in that world. As I pointed out in Chapter 2, Piaget ignored the cultural character of the environment and the infant’s social relations with other people. However, the infant’s practical intelligence involves not only actions on objects but also interactions with people. A separation between interaction with objects and interaction with people would be artificial and inappropriate at this stage: the infant encounters objects *through* the people who care for her. In the following section, then, we turn to the ways an infant interacts with the adults who are assisting and managing her life, and how this helps us understand the world of infancy.

2. THE WORLD OF INFANCY: THE “GREAT-WE”

Piaget emphasized that infancy is a time for exploring the environment, but he focused primarily on the physical characteristics of this environment. In fact, however, the space and time in which every infant lives are social, so that the circular reactions she engages in have social goals and social consequences, and the objects she interacts with are cultural artifacts. For example, the space in which an infant lives is first of all *home*, whether it be a thatched hut, a terraced house, or a palace, and a home is known not simply by moving within it but by living in it. In addition, home has been organized and arranged, divided and structured, by the adults who live there. It has a character: familiar smells, sights, and sounds. It is inhabited, by people who are “familiar” in the sense of both being known and being family. It has a temporal rhythm, ordered by the hours of the working day, the days of the week, and the seasons of the year. The infant soon becomes familiar with dinner time and bed time. Before very long she will experience the event known as a birthday. Objects too are culturally defined: they are artifacts used in particular ways, at specific times and places. Contact with these objects is generally through other people

and, equally, contact with other people is often achieved through objects. Piaget did not pay attention to this social character of the infant's world and of her sensorimotor actions in this world.

For example, Piaget recorded this observation of his daughter when she was in sensorimotor substage 4:

at 0;10 (3) Jacqueline takes my hand, places it against a singing doll which she is unable to activate herself, and exerts pressure on my index finger to make me do what is necessary. This last observation reveals to what extent, to Jacqueline, my hand has become an independent source of action by contact. (Piaget 1954[1937], p. 260)

Piaget's interpretation was that during this substage the infant begins to attribute causal powers to another person's body. In his view, since she still does not understand that persons have permanent existence, Jacqueline views their actions as depending on her own presence and influence. In short, for the infant at this stage, persons don't differ intrinsically from objects.

2.1 THE INFANT'S SOCIAL SENSITIVITY

Was Piaget correct? In the late 1960s, researchers using the new technology of portable film cameras noted that 1-month-old infants responded differently to persons and to objects. Infants only a few weeks old engaged in direct face-to-face interactions with their caregivers, interactions in which there was a notable synchrony and coordination of the partners' vocal, oral, and gestural displays (Trevvarthen, 1974; 2004). Films of interaction between mothers and newborns, for example, showed an intricately coordinated, rhythmic patterning between the two, each responding to the other's actions. Here are some written observations from the time:

the mother and infant were collaborating in a pattern of more or less alternating, non-overlapping vocalisation, the mother speaking brief sentences and the infant responding with coos and murmurs, together producing a brief joint performance similar to conversation, which I called 'protoconversation.' (Bateson, 1969, cited in Trevvarthen, 1998, p. 23)

This coordination between adult and infant was called **primary intersubjectivity** (Trevvarthen, 1979; Trevvarthen & Aitkin, 2001). **Intersubjectivity** is a term used in philosophy, psychology, sociology, and anthropology to emphasize a fundamental relatedness among people, often taken to be unconscious and emotional. It is usually used in contrast to solipsistic individual experience, to emphasize our inherently social being. It refers to phenomena such as language and social practices which cannot be reduced to subjective experience but are also not objective in the sense that they would continue even if no people existed.

This **protoconversation** generally includes specific behaviors by the infant, including mutual gaze, smiles of recognition, and vocalizing declamations. During the first six months of infancy, these proto-conversational abilities seem to outpace the child's manipulation of objects, suggesting that interaction with people can be a richer and more fundamental source of learning than interaction with physical objects. It occurred to the researchers that the newborn's innate abilities "are adapted to learning through communication with a known person" (Trevvarthen, 2004, p. 37). The infant is evidently born equipped

and motivated for organized emotional interchanges with other people (Trevvarthen, 1998, 2005). One implication is that research needs to focus not only on what an infant can do alone, but also on what she can do with appropriate human support.

When caregivers—at least in the cultures that psychologists have usually studied; that is, their own—are face to face with their infants aged 2 to 3 months they will spontaneously interact in a rhythmic way, creating a joint pattern of activity and mutual orientation. The adult treats the infant's sounds and gestures as intentional and conversational. Presumably at this young age this is not in fact the case, but this experience offers the basis for them to become so. These rhythmic interactions serve to capture the infant's attention and so they provide an occasion for learning. Adults spontaneously become interpreters of the infant's gestures and vocalizations, responding to them “as if” they are linguistic acts. As we shall see, this establishes the conditions for *actions* to become *gestures* and then *symbols* (Lock, 1978).

Certainly, caregivers interpret the appearance of **social smiling** at around 2 months of age as a sign that their infant recognizes them. They respond to this change in various ways, including increasingly the complexity of their speech to the infant, at least in Western middle-class families (Henning et al., 2005).

These interactions are a form of communication prior to language, employing on the infant's part both sounds and gestures but without the phonemic character of oral language. There is evidently “an innate emotive foundation for language and the learning of culture, and for the making of emotionally-regulated, and emotional health-regulating, social bonds” (Trevvarthen, 1998, p. 23). We shall see in Chapter 8 that this kind of patterned interaction supports, in particular, the toddler's learning of names for objects.

After 3 months of age, these protoconversations develop into participation in simple interactive and strongly rhythmic songs and nursery rhymes, and ritual play routines such as peek-a-boo. These “person–person games” involve highly predictable repetition. At first it might seem that the adult is responsible for scaffolding these interactions, but closer observation discloses that the infant can often take the initiative and become the leader.

By six months of age, infants can recognize familiar behaviors, and can distinguish between animate action and the movement of inanimate things. Around this time, games between infants and adults begin to include the use of objects. For example, Barbara Rogoff watched how several adults played with her infant son and daughter with a jack-in-the-box. In the early months, the adults tried to focus the infant's attention by working the toy and, as the bunny popped out, by saying things like “My, what happened?” By the end of the first year, in contrast, the interaction centered on how to use the toy: the adults guided the infant's hand in turning the handle and putting the rabbit back in the box. During the second year, the adults helped from a distance, using gestures and verbal prompts, such as making a turning motion with the hand (Rogoff et al., 1984). These different ways of acting together on an object enable the infant to understand, through active participation, the customary ways in which artifacts are handled. She gains a practical understanding of the objects in her world, guided by adults in ways that are adjusted to her ability and comprehension.

The discovery of these characteristics in early infant–adult interaction made psychologists and other social scientists who study young children aware that infants should be considered active agents in their social relationships. This discovery also made it seem very likely that both individual and cross-cultural differences in the ways that infants are treated and cared for can have major long-term implications for their development. A careful examination began of the ways that adults care for infants in other cultures.

This led to the awareness that there are cultures that do not foster this kind of face-to-face interaction, which has become called the “distal style” (see section 4.3 below). The distal style has been assumed to be necessary for healthy development. As we shall see, however, in many cultures a different kind of interaction, the “proximal style,” is the norm.

Towards the end of this chapter I will describe the dramatic changes that take place in the infant’s social sensitivity at around 12 months of age, as the threshold of independent locomotion is reached: in particular, the appearance of what is called “secondary intersubjectivity.”

But for the moment let us return to Piaget. It turns out that even the A-not-B task has a social character. If you watch the YouTube video of the A-not-B error you may notice that the adult researcher responds to the infant’s vocalizations and gestures as though these are bids at communication. The researcher is talking throughout the task, treating what the infant does as contributions to their interaction. For example, she asks that the object be returned to her, and while the infant is too young to place it into the researcher’s hand she does seem to drop the object in a collaborative way. Researchers have noted that an experimenter is often in the position of a teacher “inasmuch as the infant’s achievement also depended on the experimenter’s attention to the infant’s behavioral/emotional state and on optimal arrangements of learning tasks” (Papousek & Papousek, 2002, p. 184).

Indeed, 10-month-old infants commit the A-not-B error much less often when the object is hidden without the experimenter giving the usual communicative cues, such as eye contact, talking to the infant, using her name, and pointing or looking back and forth between the hiding location and the infant (Topál et al., 2008). This social dimension of laboratory research with infants has generally been ignored, presumably because we simply take for granted these patterns of adult interaction with very young children.

2.2 THE GREAT-WE OF INFANCY

The infant’s dependency has the consequence that her ability to get things done in the world depends on other people’s cooperation. From the outset the infant finds herself in a world that is thoroughly social, and the newborn has an innate “general relational capacity” (Selby & Bradley, 2003). The newborn’s innate abilities, which I described in Chapter 4, are adaptations that predispose her to learn through interaction and communication with members of her family.

Although the infant may not appear very socially skilled she actually has a specific and unique kind of sociability, and we can in truth say that this provides the basis for all her future development. Dependent on other people and exquisitely tuned to them, the infant interacts with them in an embodied way and in doing so begins to learn her family’s ways of doing things. As a result, during the first year of life the infant becomes increasingly skilled at communicating to other people what she wants from them. In a later section we shall see how this provides the basis for her active participation in the community of oral language.

However, the infant is already participating in the culture of her community, exploring the way her environment has been organized, and interacting with her caregivers. Here involvement also takes the form of people interacting with her using everyday artifacts. At first, all behavior—feeding, changing, moving—is possible only with other people’s cooperation, so that the infant’s contact with the world is largely **socially mediated**.

It is hard to judge the degree of self-consciousness of another person, but the evidence suggests that this early communality with others takes place before the infant becomes conscious of her own existence as a differentiated and separated “I.” The infant is merged and intertwined in a shared situation, which Vygotsky called the **Great-We**. The term refers to a form of consciousness prior to the differentiation between a “you” and an “I.” The Great-We of infancy provides the basis for a later differentiation in which an “I”—a first, simple sense of self-awareness—will start to form.

Infancy, Vygotsky wrote, is a time of a psychological life without a center: “He lives, but he is not conscious of his life himself” (Vygotsky, 1932–1934/1998, p. 233). Vygotsky referred to research (by Henri Wallon, a French philosopher and psychologist) on the child’s understanding of the body: the infant doesn’t at first distinguish her own body from objects in the world, then she becomes aware of objects before becoming aware of her body, and she first understands her own hands and feet as though they are foreign objects, learning to coordinate their movements before recognizing that they are parts of her own body.

Vygotsky also argued that for an infant the adult is at the center of every situation, and as adults come and go this “arms and disarms the activity of the child” (p. 231). The infant’s contact with objects occurs within a context with other people. Sara Fajans, a colleague of the famous Gestalt psychologist Kurt Lewin, found that an infant loses interest in an object that is out of reach unless an adult moves close to that object. Then the infant becomes interested again, and with the object rather than with the adult (Fajans & Lewin, 1933). It seems that for the infant the perceived object changes its properties depending on the kind of structure it is part of, a structure that includes other people.

We can see the Great-We when infants act in ways that Piaget dismissed as “magical actions,” such as reaching for an object when it is clearly out of reach. Vygotsky suggested that the infant is in fact trying to obtain an adult’s help: “the infant’s solipsistic behavior is actually social behavior characteristic of the infant’s ‘Great-We’ consciousness” (Vygotsky, 1932–1934/1998, p. 241). This proposal bears upon the point I just made about laboratory research with infants. Such research is usually carried out with adults present—the researcher, and often the mother or father—and yet attention is not paid to the possibility that the infant is trying to influence these people. However, trying to influence others must be natural to an infant; it is the only way she can get anything done. Research is needed to explore the possibility that when an infant reaches towards location A instead of B, she is trying to elicit the help of other people to get back the hidden object.

2.3 UNDERSTANDING OTHER PEOPLE: THE CONTINGENT STANCE

How should we interpret the infant’s growing capabilities in social interactions? What kind of understanding is she demonstrating of other people’s actions, and of the social world? This question has become the focus of great interest, the center of attention in a number of laboratories of infant research. Does the infant come to recognize that people have mental states such as motives and desires? Is it even possible that the infant has begun to form a “theory of mind”?

In 1989 philosopher Daniel Dennett published an influential book titled *The Intentional Stance*. Dennett defined the **intentional stance** as a strategy of predicting and explaining the behavior of an entity—living or nonliving—by attributing to that entity beliefs, desires, and other “intentional” states.

A stance, as he defined it, is a cognitive-perceptual filter or bias that influences how the person interprets events. A stance is a specific way of interpreting the world.

However, the intentional stance is only one possible way to interpret the “complex system” that is a person. There is growing evidence that each stage of development involves a different stance. The stage of infancy involves what I will call the **contingent stance**.

The most likely explanation for the emergence of primary intersubjectivity is that the infant is paying attention to, and responding to, the “causal texture” of the world. **Contingency** is a fundamental property of this texture. Two events are “contingent” when from the occurrence of one the occurrence of the other is possible, but cannot be predicted with complete certainty. Evidence suggests that an infant uses contingency information to determine very rapidly whether something, or somebody, is responsive to her. Indeed, “All humans are capable of detecting rhythmic impulses and qualities of other persons’ behaviors that are contingent upon and related emotionally to their own expressions” (Trevvarthen & Aiken, 2001, p. 31).

Infants are sensitive to the contingencies between their own behavior and events in the environment; that is, to the degree of causal relatedness between stimuli and responses. For example, when her leg movements produce a movement in a hanging mobile, a young infant will pay attention and move her leg more vigorously. Perhaps the most important innate ability of the human infant is “The capacity to accurately interpret stimulation as contingent or not” (Gergely & Watson, 1999, p. 101).

Detecting contingencies is important for coming to understand how physical objects operate. But it is central to coming to understand social interactions. From this perspective, what is most important in the face-to-face interactions of protoconversation is their contingencies: the way that one event in the exchange depends on the occurrence of another. Detailed microanalysis of these early interactions has indeed found that the adult unconsciously responds in a way that is contingent on the infant’s actions, adjusting to her behavioral state and displays of emotion (Papousek & Papousek, 2002). When this contingency is disrupted, the infant quickly reacts. For example, when an infant interacts with her mother’s live image on a video monitor all is well, but when a recording of the mother is played instead, the infant becomes upset because the contingencies are now missing (Murray & Trevarthen, 1985).

Similarly, the **still-face experiment**, where the person interacting with the infant holds their face still for a while, shows how sensitive the young infant is to the contingency pattern of face-to-face interaction, and how she will actively search to reestablish this pattern when it is disrupted. The infant quickly becomes distressed and even depressed in this situation (Papousek, 2007).

It is likely that by paying attention to contingencies, infants become able to understand other people’s behavior in terms of their **dispositions**—their characteristic inclinations or tendencies (Watson, 2005a). For example, a mother may tend to be friendly on some days, and inclined to be impatient on other days. Impatience and friendliness are dispositions, in both the psychological sense and the statistical sense: a disposition is a tendency to respond with certain contingencies to specific events. The ability to grasp dispositions by detecting contingencies is an example of how a person’s behavior can be understood without having to infer mental beliefs and desires, or even wishes and goals.

The following example illustrates how an infant can come to interpret her mother’s behavior as a sign of her dispositions. Notice that the mother is also interpreting her infant’s signs:

Imagine an infant who enjoys extended interaction with his mom. Sometimes when she tucks him in and he smiles at her, she turns out the light and leaves. Sometimes, however, she tucks him in and if he smiles, she picks him up again and interacts with him for a while longer. Alternatively, if he pouts when she tucks him in, sometimes she leaves but other times she picks him up and interacts a little longer. As a determinist [Watson uses the term “determinist stance” rather than “contingent stance”], our infant rejects the notion that his mother is behaving randomly. The fact that she might be caused to stay (or likewise caused to leave) by a smile or a pout presents no special problem, since lawfulness allows alternative causes for a specific kind of effect. However, the fact that his smile (and likewise his pout) appears to sometimes cause her leaving and sometimes cause her staying in an otherwise equivalent situation calls for remedy of the infant’s formulation of the lawful efficacy of his behavior. He needs to posit a disposition of state in his mother in order to maintain his commitment to determinism. With additional experience on his part, we might imagine ... that he will eventually uncover cues to her state variation that he has been logically forced to assume. If he is successful, then he will cope well with the fact that, in this example, his mother sometimes has rewarding days at work and sometimes has days that have depleted her reserves of nurturance. On rewarding days she views his smile as a sign he is content (so she leaves) but his pout as a sign that he needs additional comforting (so she picks him up). On her difficult days, she views his smile as a sunny reprieve (so she picks him up) but his pout as a sign that he is asking for unnecessary support that she is not prepared to give at this time. (Watson, 2005b)

Detecting contingencies is important not only for making sense of other people’s behavior, it may also enable the infant to become aware of her *own* dispositional states—that is, her own emotions. Caregivers often respond to and reflect their infant’s displays of emotion, in ways that are contingent on those displays. This provides an opportunity for the infant to develop a dawning awareness of her own emotions and to start to control them (Gergely & Watson, 1999).

Emotions in infancy are, as I will describe in the next chapter, instinctive and involuntary responses to environmental events. Caregivers spend a lot of time monitoring, interpreting, and evaluating their infant’s displays of emotion, and responding in a contingent manner. The caregivers’ responses to an upset infant can help calm her, and at the same time can provide an opportunity for the infant to learn that her display of emotion will lead to regulation of that emotion, via the route of another person. This process of **social-biofeedback** builds on the infant’s natural capacity to detect contingencies and respond to them, and on the adult’s tendency to respond to the infant’s emotions in specific ways. Together, the two participants constitute a system: “The currently dominant biosocial view of emotional development holds that mother and infant form an affective communication system from the beginning of life ... in which the mother plays a vital interactive role in modulating the infant’s affective states” (Gergely & Watson, 1999, p. 112). In short, the infant’s ability to detect contingencies provides the basis for the subtle interactions with caregivers that involve her in her family and culture from the very start.

We shall see in the following section that researchers have begun to identify culture-specific patterns of contingency between mothers and infants, and are exploring their developmental consequences.

3. CARING FOR THE INFANT

3.1 IS PARENTING INTUITIVE?

Taking care of the infant is a necessity in every part of the world, and one might think that the relatively simple and persisting demands made by infants would lead to a universal pattern of caretaking. Researchers have debated the question of whether there is a biologically based prototypical form of infant care: in particular, whether it is the biological mother who should have primary responsibility for an infant. This has been the position of some psychiatrists (e.g., Bowlby, 1980; Spitz, 1965), as well as pediatricians (Klauss & Kennell, 1976), and ethologists (Blurton-Jones, 1972).

For example, parenting has often been described in terms of **maternal sensitivity**: “sensitive responsiveness to infant signals and communications” (Ainsworth et al., 1978, p. 152). Sensitivity is defined as a mother’s ability to perceive the infant’s signals accurately and to respond to them promptly and appropriately. But what is an accurate perception? What is an appropriate response? Caregiving is not only a matter of responding to signals, it is also a matter of interpreting these signals, and caregivers’ interpretations depend on their own values and expectations and on the norms of their culture. As we shall see below, systematic differences in maternal responsiveness exist in different cultural settings.

Furthermore, caregiving involves more than paying attention to the physical needs of an infant, it is also a matter of engaging her in the social interactions which we have seen provide opportunities for learning and development.

Researchers continue to debate the extent to which parenting practices are universal and innate, and the extent to which they vary from one culture to another. On the one hand, as we saw in the previous section, mothers and fathers in many different cultures tend to behave in a gentle, playful way with their newborn. On the assumption that this behavior is unconscious and doesn’t need to be learned it has been called **intuitive parenting** (Papousek, 2007).

However, we have to be careful before assuming that such “intuitive parenting” is universal, or innate. Caregivers may respond unthinkingly to the smiles and frowns of their infant, but these unconscious reactions may be quite different from one culture to another. It has been suggested that all parents share the tasks of caring for their infant, socializing her, and transmitting culture to her (Bornstein, 2002). Nonetheless, before we accept this proposal we would need to spell out what is meant by “socialization” and “transmission.” Socialization seems the wrong term if it means that the infant needs to *become* social for, as we have seen, the newborn already has an innate sociality, and adults adapt the practices of their culture to include her. Transmission doesn’t seem the correct term either, as we saw in Chapter 3—certainly, there is much about any culture that caregivers do not deliberately transmit to their child, in large part because they take it for granted and don’t notice it. Learning the ways of a culture is an active process on the part of the child, not merely a matter of transmission.

3.2 PARENTING, CULTURE, AND ECOLOGY

Moreover, caregiving depends on much more than the characteristics and capacities of the infant. Anthropologists have since the mid-twentieth century explored the relationship between parenting and

culture, and a brief summary of the history of this research will set the stage for our examination of caregiving in the different stages of children's development, both in this chapter and those that follow (Harkness & Super, 2002).

Early on there was a strong interest in how the customs, practices, or belief systems of a culture lead parents to structure the experiences of their children in such a way as to create a specific type of personality, typical for the community. Ethnographers turned to psychology, in particular to Freud, in efforts to see if, for example, Oedipal conflicts exist in matrilineal societies. In one analysis, the Ifaluk practices of bathing infants each day in cold water and weaning them abruptly were seen as creating a sense that the world is threatening, explaining the persisting belief in malevolent ghosts in Ifaluk society. In another example, political differences between the Gusii and Nuer, pastoral communities in Africa, seemed related to differences in father-son relationships.

An interest rapidly grew in exploring how parenting was shaped by the local ecological circumstances of the community. One such investigation was carried out by Barry et al. (1959) in a comparison of 104 cultures. Their conclusion was that child rearing tends to be an adaptation to the "subsistence economy" of the community: the way the local environment is exploited for food. Hunting and gathering societies, which are not able to accumulate a surplus of food, tend to foster initiative, self-reliance, and independence in their children. In contrast, pastoral and agricultural societies, which are able to generate and store a surplus of food, tend to encourage obedience and responsibility. In general, this correlation between the "economy" and parenting is due to the ways parents involve children in various kinds of work, but it begins in the way parents handle and relate to their infants. The distinction between self-reliance and achievement on the one hand, and obedience and responsibility on the other, has continued to be important for research in this area, as we shall see below.

Anthropologists John and Beatrice Whiting organized the *Six Cultures Study of Socialization*, a large comparative study of child rearing and child development conducted in the 1960s. They proposed a general model of the relevant causal relationships (see Figure 5.8 below). In this model, childrearing depends upon the "domestic organization" of the family, which in turn rests upon the basic "maintenance systems" of a society, which in turn are determined by its local ecology. The maintenance systems include the basic economy and elementary aspects of social structure. The crops that can be grown, and the success of fishing, hunting, or herding animals, will depend on the soil, the rainfall, and linkages to other communities, with whom goods can be exchanged along with innovative ideas. These aspects of how the community derives a living from the local ecology influence the ways that dwellings are constructed and arranged spatially, and the way the household is organized: the size of the family, relations among the generations, the sexual division of labor, and so on. The practices of child rearing—who takes care of the infant, tasks assigned to older children, discipline—then depend upon this domestic organization. The Whittings hypothesized that the learned aspects of adult personality would be the products of these childrearing practices, and personality would be expressed in aspects of the culture: religion and magic, ritual and recreation, even rates of crime and suicide (LeVine, 2010; Whiting, 1963).

The Six Cultures Study tested this model with a detailed investigation of societies at the high end of the "food accumulation" dimension. The fieldwork included naturalistic observations of children between 3 and 11 years of age. The focus was on identifying the cultural pressures for parents to encourage either nurturant-responsible behavior in their children, or dependent-dominant behavior. The effect

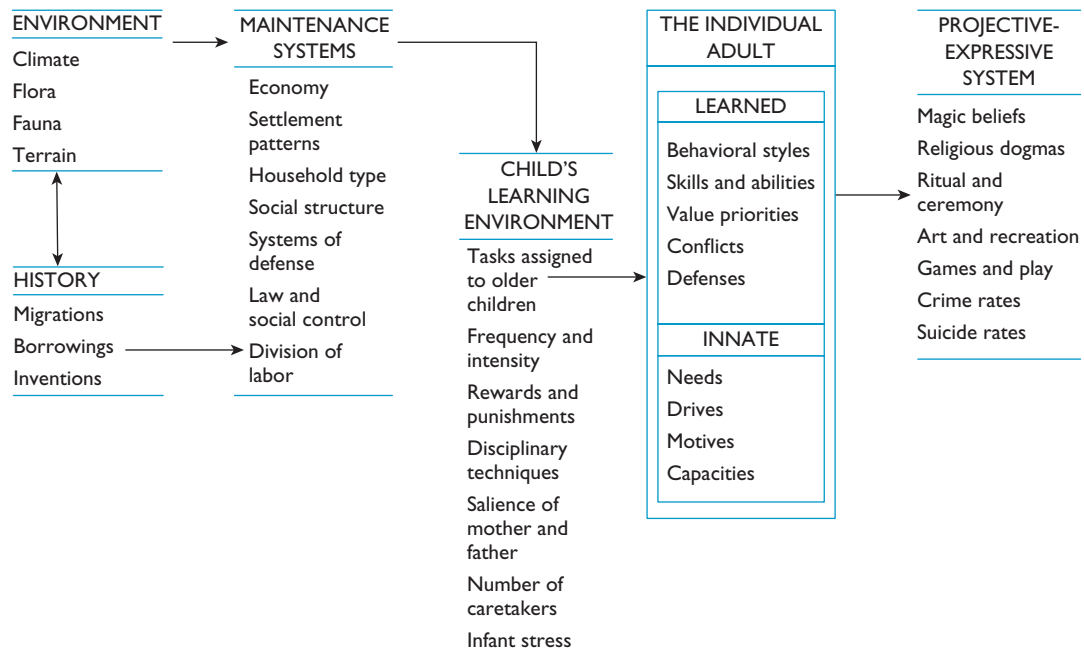


Figure 5.8 Whiting's model for psychocultural research

Source: Whiting (1977)

of parenting was assumed to take place in daily routines that were dictated by environmental factors. The main finding was that the “complexity” of the culture was an important factor. Simpler societies require cooperation, while complex societies, with a hierarchical structure and multiple roles, require competitiveness. In simpler societies, household tasks are carried out by women with their children helping. In more complex societies, children are not involved in adult work. Both the quantity and character of children’s tasks were important in encouraging a nurturant-responsible attitude. In this model, culture was viewed as a “provider of settings,” while parents were viewed as “organizers of settings” in which children develop. In particular, parents “assign” children to settings in which they then interact with different kinds of people.

The finding of a general association between economic subsistence and child-rearing practices and goals has been corroborated in many small-scale, non-Western, traditional societies.

3.3 ETHNOGRAPHIES OF INFANCY

In the 1960s researchers started to fill a gap in the Six Cultures Study: they conducted ethnographic studies of infancy and infant care, mostly in sub-Saharan Africa but also in Japan, and among the Navajo of New Mexico (many were reprinted in LeVine & New, 2008). Infants do have simple needs, but this

means that great variation is possible in how those needs are met. Anthropologists have now documented a wide variation in the arrangements made for infants in different cultures. They have paid particular attention to hunter-gatherer societies, assuming, rightly or wrongly, that this lifestyle resembles that of early *Homo sapiens*, since, as we saw in Chapter 2, agriculture was invented only 15,000 years ago. Let us consider some examples of such cultures.

A study of infant care among the !Kung bush people in Botswana found that mothers are indulgent with their infants, and place few restrictions on them (Hewlett et al., 1998). They care for the infants in a dense social context, in constant contact with relatives and friends. At night the infant sleeps beside the mother. The !Kung believe that lying down while awake is bad for the infant and so when not sitting the infant is held in a sling on the mother's hip, which provides access to the breast. The infant is fed whenever she cries, or when she is in the sling she feeds whenever she wishes. Weaning is gradual and may continue until the child is 4 or 5 if a sibling isn't born. At the end of the first year the infant begins to spend more of her time with a multi-age group of children.

!Kung infants and children are ahead of American children in tests of motor skills. In contrast, children of the Ache, in eastern Paraguay, are behind in these tests: infant Ache start walking around a year later than average. This is because the Ache live and forage in the subtropical forests. They move camp frequently, and rarely clear ground or build structures. The women focus their attention on childcare, generally doing very little work while they are carrying an infant, and children younger than three years of age stay very close to their mother: they are within a meter of her almost all the time, and in physical contact more than 80 percent of the time. Mothers are reluctant to let their infants or toddlers explore. The young children themselves only leave their mother's lap tentatively and for brief periods. Infants are almost never punished, and obtain what they want by whining and crying. When they are older they are usually obedient and helpful. However, the lack of opportunities to move around and explore the environment leads to delays in the achievement of milestones in motor development during infancy, such as sitting up, crawling, and walking. That this is not due to intrinsic biological differences is shown by the fact that older children quickly make up for these delays. They spend much of their time climbing high trees, and chopping branches and lianas with machetes. They become much more physically skilled than children the same age in the USA.

The Efe are hunters and gatherers in the forests of the Democratic Republic of Congo (formerly Zaire). They live in small groups of one or more extended families and forage with bow and arrow, or work as laborers in nearby farm communities. The Efe employ a system of multiple caretaking (Tronick et al., 1992). They live in camps of from 6 to 50 people and are semi-nomadic, moving every four to six weeks. They value cooperation, sharing and identification, and there is continuous social contact and interaction among community members. Infants spend a lot of time away from their mothers, passed among many individuals and suckled by other women. Their access to plenty of milk and continual physical contact meets the infant's need for nutrition and warmth, in an environment where the temperature is between 22 and 17 degrees Celsius. Toddlers are free to wander around the camp to watch adults at their work, making tools or cooking, and they are allowed to enter, uninvited, into most of the huts. From the age of 3 young children go with their parents to gather food, collect firewood, and work in the gardens. There are very few activities where adults focus exclusively on their children; instead the children participate alongside adults in whatever they are doing. We will explore the opportunities this provides for learning and development in Chapters 6 and 7.

Among the Aka, hunter-gatherers in central Africa, fathers provide more direct care for their infant than in any other human group that has been investigated. A study here included behavior observations of infants aged 3 to 4 months and 9 to 10 months and their caregivers. The data showed that an Aka father will be close to his infant or holding her on average more than 50 percent of every 24-hour period. In this community father and mother have virtually interchangeable roles. This pattern is in part a consequence of the fact that adults spend about 80 percent of their time hunting and gathering. Men and women collaborate to hunt hogs, duikers (small deer), and monkeys with woven nets, with the men driving the animals and the women killing them once they are caught. The fact that the women are involved in this activity means that infants are carried on the hunt, in a sling on their mother's hip, which gives the fathers an opportunity to contribute to their care. It also means that older children (or grandmothers) do not take care of infants, as occurs in many other hunter-gatherer societies, because they are not able to carry the infants on the long trips that hunting requires (Hewlett et al., 1998).

Aka husband and wife cooperate extensively and spend much time together, not only when hunting but also when in camp. Presumably this enables the infant to form emotional attachments to both of them, and this may be another reason why caregiving by the father is so prevalent. A father's care varies with the setting: he will spend more time with his young children when he is in their camp than when he is involved in economic activity in the fields or hunting. The Aka are patrilineal and patrilocal, meaning they live with the father's family or nearby. They value sharing, cooperation, non-violence, and independence. They live in camps of around 25 to 35 people, and they move to a new location every three or four months. Infant mortality is high: a female Aka will have an average of 6.3 live births, but 20 percent of infants will die before they are a year old. Although the degree of the father's involvement does not seem to relate to child mortality, an Aka infant who is born without a known father usually dies within six months.

This new anthropology of infant development, with its detailed observations of infant behavior and interactions in a cultural context, confirmed not only that infants were already participating in the practices of their communities, but also that striking variations existed in infant care among hunter-gatherer communities.

Notwithstanding the variations among such societies, agricultural societies are different again. One agricultural community that has been studied is that of the Zinacantecos. These people live in settled households, which presumably can be made safer than the jungle or forest. In such circumstances, a mother tends to delegate the care of an infant to her older children, and she spends more of her own time involved in working rather than in childcare. This may seem surprising, but the arrangement provides stimulation to the infant and may promote her development.

In addition, the researchers who studied the Aka made similar observations with the Ngandu, an agricultural community who live in the same tropical forest. Despite the infant mortality rates being similar to those of the Aka, Ngandu infants were both more stimulated by their caregivers and more often left alone. They were carried on the back rather than in slings, they were dressed more completely, and small chairs, beds and mats were made for them. The difference between the Aka and Ngandu confirms that local ecology alone does not determine parenting, rather what plays a role is the style of subsistence— foraging versus agriculture.

From about 7000 BC until around two hundred years ago, the majority of children lived in agrarian societies, centered around agriculture. Today, although many children still live in such communities,

many more live in urban and industrialized settings: in cities. Fundamental differences can be seen in how these two ways of living arrange childhood. In an agricultural society, children provide labor for their parents and offer them security in old age, consequently it makes sense for parents to have many children. In an urban, industrialized society, family ties are less strong and parents expect to contribute to their children's growth and education without receiving much in return, because children are expected to become autonomous, moving away from home to follow their own line of work and form their own family. The child-bearing years are relatively short, and old age is usually a time of few contacts with offspring. These differences in the relationship between parent and child become evident as early as infancy, as we shall see.

In short, different environments present different challenges to the health and well-being of infant and child, and caregivers will focus on meeting those challenges. Where infant mortality is high, caregivers will focus on health and survival. Where economic competition is fierce, caregivers will want their children to learn how to work and gain an income (LeVine & White, 1987).

These ethnographies draw attention to the wide variation in circumstances of infancy. We have already mentioned the variation in infant mortality across the globe. Those cultures in which infant mortality is high tend to be those in which mothers must work long and hard to obtain the basic necessities of life. In the West we tend to think of the first year of life as a time when infants and parents, especially mothers, should have close and intimate contact. But in impoverished communities such contact may be impossible, and it may be undesirable in the sense that parents may be reluctant to form close emotional bonds with their infant when the chances are high that their child will die.

3.4 SPECIFIC PRACTICES OF INFANT CARE

As we saw in the previous chapter, an example of a caregiving practice that varies widely across cultures is the decision over something as seemingly simple as where, and with whom, the baby sleeps (Shweder et al., 1995). The question of which family members share sleeping space always evokes strong feelings about what is right or wrong, but there is considerable variation across cultures. In North America the infant is usually not expected to sleep in the parents' bed, at least in white middle-class families. Outside the USA, however, this attitude is often viewed as cruel. In Japan, infants usually sleep with their parents, and co-sleeping continues until early adolescence. Not to sleep in this way is seen as very strange (Caudill & Plath, 1966). Research in a Hindu town in India found that sleeping was arranged so that young children were protected at night by sleeping with someone older. In addition, unmarried girls should not sleep alone so their chastity can be protected, and arrangements for older brothers and sisters prevent incest. If to do this requires that a husband and wife must sleep apart, this is not considered a problem (Shweder et al., 1995).

Similarly, in a Mayan community in Guatemala, infants slept with their mother until a new sibling arrived; then they moved into someone else's bed. Throughout childhood, both boys and girls generally slept with other family members (Morelli et al., 1992).

The issue of who sleeps alongside whom is resolved by making social arrangements of space and time which the infant inevitably participates in, and which become routine and customary. The social circumstances of a family are experienced as a natural necessity by the infant, who without knowing it has entered the specific social position that her family occupies in the community.

3.5 PROXIMAL AND DISTAL STYLES

In another move to make sense of the cultural variation of caregiving, researchers have identified distinct styles of caregiving with infants: the distal style and the proximal style (Keller et al., 2004).

Heidi Keller and her colleagues compared a sample of middle-class families living in Athens, Greece, with a sample of families in the rural Nso community in the Cameroon. The first of these is considered a culture of *independence*, in which autonomy and separateness are valued. The second is considered a culture of *interdependence*, in which hierarchy, obedience, and respect are valued. As we have seen, traditional agricultural societies tend to have these values of interdependence.

Families were visited in their home when their infants were 3 months of age, and again between 18 and 20 months. A free-play situation was videotaped, and analysis of the interaction between mother and infant disclosed two distinct styles.

The Greek mothers tended to emphasize face-to-face interaction with mutual eye contact, and the displaying of objects to the infant. The researchers called this the **distal parenting style**, because the mothers kept their infant at a distance, and they hypothesized that this style established a framework of mutuality between mother and infant, within which the infant had a relatively high degree of control over the interaction, and that it started the infant along a developmental trajectory towards independence and autonomy. (This is the style we saw early in face-to-face protoconversation.)

The Nso mothers, in contrast, emphasized body contact and physical stimulation. The researchers called this the **proximal parenting style**, and they hypothesized that this style promoted interdependence, unity and fusion rather than separateness, and established synchrony between mother and infant, rather than reciprocity.

In Chapter 7 I will describe the relationship between these styles of interaction in infancy and measures of later development, including the toddler's self-recognition at 20 months of age. Here, I want to describe two further developments of this line of research.

First, Relindis Yovsi extended the study of parenting style into the practice of breastfeeding (Yovsi & Keller, 2003). She visited two ethnic groups in Cameroon: the sedentary Nso farmers we have already met and nomadic Fulani pastoralists. These two groups live in the same region, they suffer similar degrees of poor health in a dangerous environment and the same high rate of infant mortality, but they have different economic systems, and correspondingly different values and goals for their children's development.

Among the Nso, who live in a subsistence-based farming ecology, the infant is cared for not only by her parents and relatives but also by neighbors, since childcare is considered a responsibility of the whole community. As we have seen, the Nso value interdependence. They encourage in their children obedience and respect for authority, a responsibility to others, and a commitment to social harmony. Breastfeeding of infants is highly encouraged, because it brings mother and child together and also because the community values strong healthy children.

Among the Fulani, in contrast, children are cared for only by their immediate family, including older siblings. After birth the grandmother takes the infant away so her mother can rest. Since the Fulani believe that colostrum is bad for the infant, she is fed only water until the mother's breast milk is available. After that, the infant is breast fed for about two years, due to the belief that a child not fully breastfed will mismanage the herd and tend to depend on other people for a living.

Among the Fulani, eye contact between children and parents is forbidden, because it is believed that intimacy should not be part of their relationship. Hugging and holding are considered erotic and sexual, and are forbidden between parent and child. It is said that if a mother shows interest in her child the evil eye will curse or kill the child. The Fulani, who have to protect, manage, and accumulate their cattle, value competence, a respect for elders, commitment, and self-reliance.

When their infants were around 4 months of age Yovsi visited each family in the two communities and observed a routine breastfeeding session. Infant and mother behaviors were coded. Nso and Fulani mothers differed significantly in their modes of interaction during breastfeeding. The Nso engaged more in tight body contact, tactile stimulation, and were more involved. Infant and mother often smiled at one another. The Nso mothers were concerned and responsive to cues from their infant, with the consequence that the infant was kept in an alert state. The Fulani were more distant and less affectionate with their infants during breastfeeding. They engaged in very little eye contact, generally looking away from the infant, and were unlikely to respond to cues such as vocalizations or movements.

This identification of differences in style of mother–infant interaction is important, but so too is the implication that in *every* culture the infant is encouraged through everyday practices of caregiving to become the kind of person that is valued in her culture. This investigation shows us that breastfeeding not only meets the nutritional needs of the infant, it is also an adaptive process in which parental goals are embodied in the practical activity in which mother and infant interact. The infant is learning to participate in the practices of her community in such a way that her development begins to follow a specific trajectory.

The second extension of the research on proximal and distal parenting styles is the proposal by Joscha Kärtner that these two styles begin to establish distinct developmental trajectories because they involve culture-specific patterns of contingency. Kärtner (2015) applied the social-biofeedback model (Gergely & Watson, 1996) that we discussed earlier in this chapter to review similarities and differences in maternal contingent responsiveness toward infants, in research with 159 3-month-olds across six different sociocultural contexts. His conclusion was that systematic and predictable differences in contingency patterns did exist across these cultures. There is strong evidence that visual contingencies are significantly higher in cultures that value autonomy and independence (such as Berlin and Los Angeles), whereas in cultures that value relation and interdependence, such as the Nso families, the contingencies occur in the proximal modality.

For example, in a comparison between middle-class German and Nso mothers, the pattern of mothers' contingent responsiveness to their infant was identical at 4 and 6 weeks after the birth, but differences started to emerge around week 8. By week 12, the Nso mothers were showing significantly higher levels of proximal contingent responses to their infant. The German mothers, in contrast, showed a steady increase in visual contingencies during the second and third months, and a steady decrease in proximally contingent responses during this time. That is, they shifted from a proximal to a visual (distal) style.

As a result, infants in the two cultures were already very different at the time of the “two-month transition,” when, as we saw earlier, face-to-face social interactions between infant and adult increase greatly. This increase did indeed take place for the German infants. However, the pattern of the two-month transition was very different for the Nso infants. Like the German babies they showed a sharp increase in awake alertness between the ages of 6 and 8 weeks, but their mothers offered them little opportunity

	Distal Style	Proximal Style
Characteristics	Face-to-face interaction; stimulation with objects	Body contact and physical stimulation
Caregivers' values	Independence and autonomy	Interdependence, compliance and obedience
Developmental outcomes during infancy	Social smiling from 2 months	Absence of social smiling
Cultures	Urban families in Athens, Berlin, Los Angeles	Nso and others

Figure 5.9 The distal and proximal caregiving styles

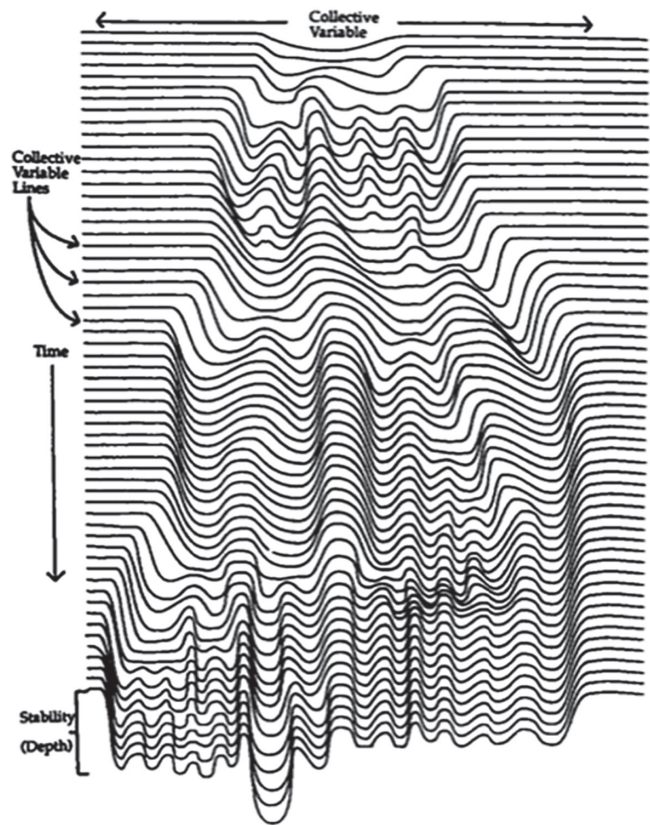


Figure 5.10 Development depicted as an epigenetic landscape

Source: Thelen (1995)

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for face-to-face interaction, and their interest in their mothers' faces (i.e., their gazing behavior) did not increase with age. In fact, the amount of mutual gaze remained low from 1 month of age to 3 months of age.

Evidently, the face-to-face interactions of primary intersubjectivity and social smiling are not universal characteristics of infant development, but are characteristics of specific cultures with specific caregiving styles and particular goals for development. For the Nso the ideal infant is emotionally neutral, and calmness is considered desirable. Smiling and laughing are considered signs of overexcitement and a disruption of emotional equilibrium (Kärtner et al., 2013). Nso mothers spontaneously interact with their infants in ways that foster precisely these desired characteristics, though they would be judged “insensitive” by Western standards.

This divergence of possible trajectories during development has been described in terms of an **epigenetic landscape** (Waddington, 1940). In the figure each horizontal line is a slice in time, and the curves represent the probability that the



Figure 5.11 Nso mother encouraging motor development

Source: Keller (2003)

system will adopt a specific behavioral configuration, represented as a valley. Development can be visualized as a movement towards increasing possibilities, represented by the larger number of valleys as time moves downward. But along the way choices must be made—one valley will be followed rather than another, and some possibilities are lost because there is no turning back. Shallow valleys are easier to move out of, deeper valleys are harder. The term for a process of development that can follow any one of many trajectories is **equifinality**: many ends are possible.



Figure 5.12 Nso, practice in walking

Source: Keller (2003)



Figure 5.13 German mother engaging her infant in face-to-face interaction

Source: Keller (2003)

3.6 CAREGIVING AS NICHE CONSTRUCTION

One final way that caregiving and parenting have been conceptualized is in terms of the construction of a “developmental niche” or “ontogenetic niche.” This approach has obvious connections with the proposal in Chapter 3 that evolution involves organisms that actively construct for themselves and their offspring an environmental niche. Human caregiving can be considered as a “culturally constructed interface between the larger environment and the development of children” (Super & Harkness, 2002, p. 271). The emphasis here is not so much on why parenting varies from culture to culture, but on how parenting works. Caregivers not only choose settings and establish routine activities within these settings, they also actively construct the settings in which they interact with their children.

Adult organisms of many species make material arrangements for their offspring, specialized niches that foster their development, survival, and in time their reproduction, and humans are no exception. In ecology these specialized arrangements are known as “ontogenetic niches” (Werner & Gilliam, 1984). These niches are enormously diverse—even with young infants they range from pouches in which they are carried (Tronick et al., 1994), to the cribs in which they sleep, the nurseries in which they are sheltered, and many more. These are adaptive modifications of the environment, to which not only parents contribute but also other kinds of caregiver, and they reflect historically shaped customs and practices of care and rearing. They also result from parents’ beliefs about development and their aspirations for their children.

One influential proposal has been that the human **developmental niche** comprises three subsystems. First is the physical and social setting. Second are the historically formed customs and practices of childcare and child rearing. Third is the psychology of the caretakers, in particular their **ethnotheories** about childcare: these are, by definition, shared with other members of the community (Harkness & Super, 1994; Super & Harkness, 1986).

Charles Super and Sara Harkness suggest that the operation of these subsystems has several important consequences for the child’s development. One of these is **redundancy**, the repetition of influences from several parts of the niche in a way that is mutually reinforcing. A second is **thematic elaboration**, the repetition and accumulation of significant symbols and interpretive frameworks. A third is **chaining**, in which no single element of the niche is sufficient to produce a particular outcome but the linking of disparate elements creates qualitatively new phenomena (Super & Harkness, 2002).

The notion of the ontogenetic niche contributes to what Harkness and Super (2002) have described as the central challenge to our understanding of caregiving in a cultural context—“reconceptualizing culture in relation to development,” namely recognizing that culture is a dynamic system not a static entity. This calls, in their view, for the “developmental study of culture,” an exploration of how culture “is created across the lifespans of individuals in families and communities” (2002, p. 276). How the developing child becomes capable of contributing to this continuous recreation of culture is a significant aspect of the account in this book.

In conclusion, faced with their newborn, adults have to adapt to their new role as parents. The dependence of the newborn baby has obvious implications for her caregivers, who have to provide for their new arrival. They have to arrange every aspect of their baby’s daily activity, from feeding and sleeping to changing diapers and clothing. But parents will have to balance their own growth and development

with their investment in their new charge. They will also have to balance the needs of the child with the requirements of work and the other daily demands of their family and community.

At the same time, of course, infants change their parents. As Marc Bornstein has pointed out, “By their very coming into existence, infants forever alter the sleeping, eating, and working habits of their parents; they change who parents are and how parents define themselves” (Bornstein, 2002, p. 3). It seems most accurate to say that infants and caregivers are necessarily involved in each other’s activity, and because the parents are already skilled in the ways of the culture the infant starts to engage with cultural artifacts, learning the ways of her community and starting to understand the social world in which she lives.

Parents also take for granted a certain balance of relatedness and autonomy. As a consequence, they start to adopt a style of caregiving which unconsciously fosters a specific pathway in their baby’s development (Kagitcibasi in Chapter 10). Since infancy is that stage of maximal dependency, the infant is generally woven especially tightly into the caregivers’ daily activity, especially that of the mother.

Whatever arrangement a culture makes for an infant’s care, her dependence means that she has no other option but to be deeply involved with caregivers. In addition, her sensibilities and sensitivities, including the dramatic ongoing growth and development of the brain which we have discussed, mean that she will be importantly influenced by these involvements.

I have emphasized that the human infant lives in a social world, within which her actions are mediated by other people. I have called this social situation of infancy the “Great-We.” Parenting is a matter of how adults make arrangements in order to meet an infant’s needs, since she cannot satisfy these needs by herself. The practices of parenting vary from one culture to another, as do the beliefs and expectations about their infants’ development that parents express when psychologists interview them. This suggests that even if parenting has some kind of biological basis, so that “intuitive parenting” is spontaneous, parenting is also a product of culture. Indeed, we should surely expect this.

Parents are adults who have grown up in a particular culture and learned to be skilled in its practices. It is inevitable that their skills and attitudes play a role in the way they respond to an infant. This means, however, that parenting is not just a matter of taking care, it is also a **pedagogic interaction**. The social moment in development is of central importance.

Adaptive needs	Population-level patterns	Cultural goals of child care
<i>Subsistence:</i> Provision of food	Economic systems: foraging, agrarian, industrial	Economic competence
<i>Reproduction:</i> Somatic continuity	Marriage and kinship systems, demographic regimes, norms of infant care	Childbearing and survival, acquisition of gender roles
<i>Communication:</i> Sharing of information	Languages and other symbol systems	Communicative competence
<i>Social regulation:</i> Maintenance of order	Social hierarchies, conventions of face-to-face relations	Self-control, situationally appropriate behavior

Figure 5.14 Framework for the comparative analysis of child care

Source: LeVine et al. (1996)

CONCLUSION

The newborn enters the stage of infancy completely dependent on other people, and sensitively attuned to those people. Infancy is a year of important learning, as the infant builds a practical understanding of the world around her. This is a cultural world, with social spaces, times, and artifacts; the infant lives in an “ontogenetic niche” that has been constructed by her caregivers to meet her needs (and theirs) in a manner that reflects their projections of her future. Of course, the infant understands this niche in a very simple way. She is sensitive primarily to the contingencies of events—the conditional relationships between what she does and what other people and objects do. Adult responses to her emotions, for example, provide an opportunity to grasp contingencies. This is a very basic level of understanding: the infant does not yet even recognize that something that has been partly hidden is still a whole object. Yet this simple, practical understanding paves the way for what is to follow.

The infant’s practical understanding can be viewed in a variety of ways. It can be understood in terms of the *schemas of sensorimotor intelligence*. An emphasis can be placed on *primary intersubjectivity* (and later on *secondary intersubjectivity*). It can also be considered the operation of the unconscious and intuitive *System 1*. And it can be viewed as a *grasp of contingencies*.

In other words, infancy is a stage when the perception–action cycle (see Chapter 4, section 1.4.3) is functioning on its most fundamental levels. For an infant, to see something is to act towards it, though her action generally requires the assistance of another person. Perception, action, emotion, sociality are all aspects of an infant’s way of being in the world; they have not yet become distinct. We lose sight of this important fact when we study, or write about, infancy in terms of distinct domains of physical, social, emotional, and cognitive development.

Caregivers the world over probably share many goals and concerns for their infants. Yet the diverse circumstances in which they live prompt them to employ different caregiving styles. Some aspects of caregiving may be intuitive and innate, but many aspects have to be learned: from relatives, from experts, or through trial and error. Caregivers play an especially crucial role at this stage in a child’s development. They do for the infant what she cannot do for herself, and this is a matter not only of her biology—feeding and cleaning her—but also of her psychology.

SUMMARY

THE INFANT’S PRACTICAL UNDERSTANDING

Infancy is a stage of what Piaget called “sensorimotor” intelligence. He proposed that the infant is actively constructing a practical understanding of the world: of space, time, causality, and objects. Researchers working with different theoretical frameworks have different views about what this practical understanding consists of.

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THE WORLD OF INFANCY: THE “GREAT-WE”

The extreme dependence of the human infant means that all her action in the world must be mediated by other people. The infant lives in a Great-We, in which she has not yet differentiated psychologically from her caregivers. The infant is able to detect contingencies in her interactions with other people—technically speaking, the conditional probabilities between stimulus events and responses, and in more simple terms, the degree to which events happen together. When adults respond contingently to an infant, they provide bio-social feedback.

CARING FOR THE INFANT

Ethnographic studies of caregiving in different cultures have found great variety in how the simple, basic needs of infants are met. Two particular caregiving styles have been identified: the distal style, which encourages independence and autonomy, and the proximal style, which encourages interdependence and obedience.

FURTHER READING

LeVine, R. A., & New, R. S. (2008). *Anthropology and Child Development: A Cross-cultural Reader*. Malden, MA: Blackwell.

Learn more about Dynamic Field Theory:

www.uiowa.edu/delta-center/research/dft/index.html

Shonkoff, J. P., & Phillips, D. (2000). *From Neurons to Neighborhoods: The Science of Early Childhood Development*. Washington, DC: National Academies Press.

‘Shaping the Developing Brain: Prenatal through Early Childhood’: Fifth Annual Aspen Brain Forum, November 11–13, 2014, The New York Academy of Sciences:

www.nyas.org/Events/Detail.aspx?cid=4757ae98-7fa3-4f07-a77d-d8693dd50a42

ONLINE RESOURCES

See the A-not-B error on YouTube:

www.youtube.com/watch?v=IhHk3InQOE