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PIAGET'S THEORY OF DEVELOPMENT

At age 7 months, 28 days, I offer him a little bell behind a cushion. So long as he sees the little bell, however small it may be, he tries to grasp it. But if the little bell disappears completely he stops all searching.

I then resume the experiment using my hand as a screen. Laurent's arm is outstretched and about to grasp the little bell at the moment I make it disappear behind my hand which is open and at a distance of about 15 cm. from him. He immediately withdraws his arm, as though the little bell no longer existed. I then shake my hand. . . . Laurent watches attentively, greatly surprised to rediscover the sound of the little bell, but he does not try to grasp it. I turn my hand over and he sees the little bell; he then stretches out his hand toward it. I hide the little bell again by changing the position of my hand; Laurent withdraws his hand. (Piaget, 1954, p. 39)

What does this infant's odd behavior tell us? Piaget (1954) advanced one provocative interpretation: that Laurent did not search for the bell because he did not know that it still existed. In other words, his failure to search was due to his inability to mentally represent the bell's existence. It was as if the infant's thinking embodied the strongest possible version of the adage "Out of sight, out of mind."

This chapter is the only one in the book whose title includes a person's name. This is no accident. Jean Piaget's contribution to the study of cognitive

development is a testimony to how much one person can do. Before Piaget began his work, no recognizable field of cognitive development existed. Yet despite thousands of studies on children's thinking having been conducted in the interim, even Piaget's earliest research is still informative. What explains the longevity of Piaget's theory?

Perhaps the most basic reason is that Piaget's theory communicates an almost tangible sense of what children's thinking is like. His descriptions feel right. Many of his individual observations are quite surprising, but the general trends he describes appeal to our intuitions and to our memories of childhood.

A second important reason is that the theory addresses topics that have been of interest to parents, teachers, scientists, and philosophers for hundreds of years. At the most general level, the theory speaks to such questions as "What is intelligence?" and "Where does knowledge come from?" At a more specific level, the theory examines development of the concepts of time, space, number, and other ideas that are among the basic intellectual acquisitions of humankind. Placing the development of such fundamental concepts into a single coherent framework has made Piaget's theory one of the significant intellectual achievements of our century.

A third reason for the theory's longevity is its exceptional breadth. It covers an unusually broad age span—the entire range from infancy through adolescence. Children's understanding of concepts such as cause and effect can be seen evolving from rudimentary forms in infancy to more complex forms in early childhood to yet more complex forms in middle childhood to even more complex forms in adolescence. The theory also encompasses an unusually broad variety of achievements at any given age. For example, it brings together 5-year-olds' scientific and mathematical reasoning, their moral judgments, their drawings, their idea of cause and effect, their use of language, and their memory for past events. One of the purposes of scientific theories is to point out the commonalities underlying seemingly unrelated facts. Piaget's theory is especially strong on this dimension.

A fourth reason for the theory's having endured is that Piaget had the equivalent of a gifted gardener's "green thumb," a knack for making interesting observations. One of these observations was quoted at the outset of this chapter: the one concerning infants' failure to search for objects if they cannot see them. Many of his other intriguing observations are described throughout this chapter.

Because of the range and complexity of Piaget's theory, it seems worthwhile to approach it first in general terms and then in greater depth. The first section of this chapter provides an overview of Piaget's theory. The second section describes children's thinking during each of his four stages of development. The third focuses on his description of the development of several especially important concepts from birth through adolescence. The fourth is an evaluation of the theory. Table 2.1 depicts this organization.

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An Overview of Piaget's Theory

Piaget's theory is sufficiently broad and complex that it is easy to lose the forest for the trees. This section provides an overview of the forest.

THE THEORY AS A WHOLE

To appreciate Piaget's theory, it is essential to understand his motivation for developing it. This motivation grew out of Piaget's early interest in biology and philosophy. When he was 11 years old, he published his first article, which described an albino sparrow he had observed. Between the ages of 15 and 18, he published several more articles, most of them about mollusks. The articles must have been impressive. When Piaget was 18, the head of a natural history museum, who had never met him but who had read his articles, wrote a letter offering him the position of curator of the mollusk collection at the museum. Piaget turned down the offer so that he could finish high school.

In addition to this early interest in biology, Piaget was keenly interested in philosophy. He was especially drawn to *epistemology*, the branch of philosophy concerned with the origins of knowledge. The theory of the eighteenth-century philosopher Immanuel Kant, who, like Piaget, was most interested in the origins of knowledge, was a source of particular fascination for him.

The combination of philosophical and biological interests influenced Piaget's later theorizing in several ways. It led to the fundamental question underlying the theory: "Where does knowledge come from?" It also influenced the particular problems Piaget chose to study. He followed Kant in viewing space, time, classes, causality, and relations as basic categories of knowledge. At the same time, he opposed Kant's position that these basic categories of knowledge were innate to human beings. Instead, he believed that children came to understand the concepts increasingly deeply during infancy, childhood, and adolescence. Perhaps most important, the joint interest in philosophy and biology suggested to Piaget that long-standing philosophical controversies could be resolved by applying scientific methods. Just as Darwin attempted to answer the question "How did people evolve?" Piaget attempted to answer the question "How does knowledge evolve?"

Having this background, we can now consider the theory itself. At the most general level of analysis, Piaget was interested in intelligence. By this he meant a broader quality than what is measured on intelligence tests. He viewed intelligence as the ability to adapt to all aspects of reality. He also believed that within a person's lifetime, intelligence evolves through a series of qualitatively distinct stages. These stages, and the developmental processes that produce the transitions from one stage to the next, are described in the next two sections.

THE STAGES OF DEVELOPMENT

As noted in Chapter 1, stage theorists such as Piaget make certain characteristic assumptions. They assume that children's reasoning in earlier stages differs qualitatively from their reasoning in later ones. They also assume that at a given point in development, children reason similarly on many problems. Finally, they assume that after spending a prolonged period of time "in" a stage, children abruptly make the transition to the next stage.

Piaget postulated that all children progress through four stages and that they do so in the same order: first the *sensorimotor period*, then the *preoperational period*, then the *concrete operational period*, and finally the *formal operational period*. The sensorimotor period typically spans the period from birth to about the second birthday, the preoperational period lasts roughly from age 2 to age 6 or 7, the concrete operational period extends from about age 6 or 7 to 11 or 12, and the formal operational period includes all of adolescence and adulthood.

First consider Piaget's characterization of the sensorimotor period, which lasts from birth through age 2. Piaget believed that at birth, a child's cognitive system is limited to motor reflexes. Within a few months, however, children build on these reflexes to develop more sophisticated procedures. They begin to systematically repeat initially inadvertent behaviors, to generalize their activities to a wider range of situations, and to coordinate them into increasingly lengthy chains of behavior. Children's physical interactions with objects provide the impetus for this development.

The preoperational period encompasses the age range from 2 to 6 or 7 years. The greatest achievement of this period is the acquisition of means for representing the world symbolically: mental imagery, drawing, and especially language. Children's vocabulary increases 100-fold between 18 and 60 months (McCarthy, 1954), and their utterances progress from one- and two-word phrases to sentences of indefinite length. In Piaget's view, however, preoperational children can use these representational skills only to view the world from their own perspective. They focus their attention too narrowly, often ignoring important information. They also cannot accurately represent transformations and instead are able to represent only static situations.

The concrete operational period encompasses the age range from 6 or 7 to 11 or 12 years. Concrete operational children can take other points of view, can simultaneously take into account more than one perspective, and can accurately represent transformations as well as static situations. This allows them to solve many problems involving concrete objects and physically possible situations. However, they do not yet consider all of the logically possible outcomes and do not understand highly abstract concepts.

Formal operations, attained at roughly age 11 or 12, is the crowning achievement of the stage progression. Children who attain formal operations are said to reason in terms of theories and abstractions as well as concrete realities. This broader perspective brings with it the potential for solving many types of problems that are impossible for children in earlier stages. Although Piaget recognized that particular knowledge and beliefs continue to change, he believed that the basic mode of reasoning that characterizes the formal operational stage is sufficiently powerful to last a lifetime.

DEVELOPMENTAL PROCESSES

How do children progress from one stage to another? Piaget viewed three processes as crucial: *assimilation*, *accommodation*, and *equilibration*.

Assimilation. Assimilation refers to the way in which people transform incoming information so that it fits their existing way of thinking. As an example, consider the following anecdote. When Siegler's older son was 2, he encountered a man who was bald on the top of his head and had long, frizzy hair growing out from each side. To Siegler's embarrassment, on seeing the man, his son gleefully shouted, "Clown, clown." (Actually, it sounded more like "Kown, kown.") The man apparently possessed the features that the boy believed distinguished clowns from other people, and thus became a "kown."

Assimilation is important throughout life, not just in early childhood. Consider the experience of a music critic, Bernard Levin. Levin noted that when he heard the premiere performance of Bartok's *Concerto for Violin and Orchestra*, early in Bartok's career, neither he nor other critics could make sense of it or later remember it in any detail. It was simply confusing and annoying to the ear.

However, when he next heard the piece, almost 20 years later, it seemed eminently musical. Levin's explanation was that in the ensuing period, "I had come to hear the world with different ears" (*London Daily Telegraph*, June 8, 1977). In Piaget's terms, he initially was unable to assimilate the Bartok piece to his understanding of music. Twenty years later, he was able to do so.

One interesting type of assimilation that Piaget described is *functional assimilation*, the tendency to use a mental structure as soon as it becomes available. Illustratively, when Siegler's older son was first learning to talk, he spent endless hours talking in his crib, even though no one else was present. A few years later, he would turn somersaults over and over again, despite encouragement from his parents to stop. Piaget contrasted this source of motivation with behaviorists' emphases on external reinforcers as motivators of behavior. In reinforcement, the reason for engaging in an activity is the external reward that is obtained. In functional assimilation, the reason for engaging in the activity is the sheer delight of mastering new skills.

Accommodation. Accommodation refers to the ways in which people adapt their thinking to new experiences. Returning to the "kown" incident, after biting his lip to suppress a smile, Siegler told his son that the man they had seen was not a clown; that even though his hair was like a clown's, he wasn't wearing a funny costume and wasn't trying to make people laugh. The goal was to help the child accommodate his idea of "clown" to the concept's standard meaning.

Assimilation and accommodation mutually influence each other; assimilation is never present without accommodation and vice versa. On seeing a new object, an infant might try to grasp it as he has grasped other objects (thus assimilating the new object to an existing approach). However, he also would have to adjust his grasp to conform to the shape of the new object (thus accommodating his approach as well). The extreme case of assimilation is fantasy play, in which children gloss over the physical characteristics of objects and treat them as if they were something else. The extreme case of accommodation is imitation, in which children minimize their interpretations and simply mimic what they see. Even at the extremes, elements of each process are present. Children at play do not totally ignore physical properties. (Beds almost never are assimilated as teacups, even in fantasy play.) Conversely, when we do not understand what we are doing, imitation often is imperfect. (Try to repeat verbatim a 10-word sentence from a language that you do not speak.)

Equilibration. Equilibration is the process by which children integrate their many particular pieces of knowledge of the world into a unified whole. It thus requires balancing assimilation and accommodation. It also is the keystone of developmental change within Piaget's system. Piaget saw development as the formation of ever more stable equilibria between the child's cognitive system and the external world. That is, the child's model of the world increasingly resembles reality.

Piaget also suggested that regardless of when in life it occurs, equilibration includes three phases. First, children are satisfied with their mode of thought and therefore are in a state of equilibrium. Then they become aware of shortcomings in their existing thinking and are dissatisfied. This constitutes a state of disequilibrium. Finally, they adopt a more sophisticated mode of thought that eliminates the shortcomings of the old one. That is, they reach a more stable equilibrium.

To illustrate the equilibration process, suppose a 6-year-old girl thought that animals were the only living things. (In fact, most 4- to 7-year-olds do think this; see Hatano, Siegler, Richards, Inagaki, Stavy, & Wax, 1993.) At some point, the girl might realize that plants, like animals, grow and die. This realization might create a state of disequilibrium, in which she was unsure if plants were alive and what it meant to be alive. Eventually she would learn that the critical attributes of life are growth and reproduction, that both plants and animals possess them, and that both therefore are alive. The new understanding would constitute a more stable equilibrium, since further observations would not call it into question (unless the girl later became interested in certain viruses and bacteria whose status as living things continues to be debated by biologists).

This overview of assimilation, accommodation, and equilibration might create an impression that these change processes apply solely to specific, short-term cognitive changes. In fact, Piaget was especially interested in their capacity to produce far-reaching, longer-term changes, such as the change from one developmental stage to the next. Illustratively, the particular realizations that frizzy hair that looks like a clown's does not make its bearer a clown, that plants are alive even though they don't move, and that the sun's looking like gold does not mean it is gold are part of a more general trend from preoperational to concrete operational reasoning. Piaget believed that children generalize the assimilations, accommodations, and equilibrations involved in these particular changes into a broad shift from emphasizing external appearances to emphasizing deeper, enduring qualities.

ORIENTING ASSUMPTIONS

The child as scientific problem solver. Piaget often likened children's thinking to that of scientists solving problems about the fundamental nature of the world. He applied the metaphor even to the thinking of infants. When an infant varied the height from which she dropped food from her highchair and observed how the results varied, Piaget detected the beginnings of scientific experimentation.

At least three considerations led Piaget to concentrate on scientific reasoning and problem solving. One was his view of what development was. Piaget viewed development as a form of adaptation to reality. A problem can be viewed as a miniature reality. The way children solved problems thus could lead to insights about how they adapted to all kinds of challenges that life posed.

A second reason for Piaget's emphasis on problem solving relates to his views about how and why development occurs. Equilibration only happens when some problem arises that disturbs a child's existing equilibrium. Thus, problems, which by their very nature challenge existing understandings, have the potential for stimulating cognitive growth. If encountering problems stimulates cognitive growth, then an interest in cognitive growth would naturally lead to an interest in problem solving.

A third reason for Piaget's focus on problem solving concerns the insights that can be gained by observing children's reactions to unfamiliar situations. Piaget noted that everyday activities may be performed by rote; when this is the case, they reveal little about children's reasoning. For example, if we ask a boy to name the capital of France, and he says "Paris," we learn little about his reasoning. We just learn that he knows the particular fact. By contrast, when children are unfamiliar with problems, their solution strategies reveal their own logic.

The role of activity. Piaget emphasized cognitive activity as the means through which development occurs. Assimilation, accommodation, and equilibration are all active processes by which the mind transforms, and is transformed by, incoming information. As Gruber and Voneche (1977) noted, it was significant that Piaget titled one of his most famous books *The Construction of Reality in the Child*. Within Piaget's approach, reality is not waiting to be found; children must construct it from their own mental and physical actions.

This distinction between a found reality and a constructed reality is analogous to the distinction between a picture of a bridge and an engineer's model of the forces operating on the bridge. A picture simply reflects the bridge's superficial appearance. In contrast, the engineer's model emphasizes the relations among components and how the structure distributes stresses. Piaget believed that children's mental representations, like the engineer's model, emphasize structural relations and causes. He also believed that the only way that children can form such representations is to assimilate their experience to their existing understandings. Even when a relation is explained to them, they must actively integrate it with their own general understanding in order to remember it.

Methodological assumptions. Early in his career, Piaget perceived a trade-off between the precision and replicability that accompany standardized experimental procedures and the rich descriptions and insights that can emerge from methods that are tailored to the individual child. He also recognized the trade-off between the unexpected information that can emerge from talking with children and having them explain their reasoning and the possibility of underestimating the quality of their reasoning because of their inarticulateness.

Recognizing these trade-offs, Piaget used different methods to study different topics. His studies of infants, conducted early in his career, were based on observations of his own children, Jacqueline, Laurent, and Lucienne, in everyday

situations and in simple informal experiments that he devised. His early studies of moral reasoning, causation, play, and dreams relied almost entirely on children's answers to hypothetical questions. His later studies of number, time, velocity, and proportionality relied on a combination of children's interactions with physical materials and their explanations of their reasoning.

Generally, when the choice was whether to follow standardized methods or to flexibly tailor tasks and questions to the individual child's actions and statements, Piaget opted for flexibility. This choice may have led him astray at times. Some of his conclusions may have been due to his methods' underestimating children's knowledge. However, the flexible methods also allowed him to follow up unexpected observations, resulting in remarkable discoveries and insights that might never have emerged using standardized procedures.

Possessing this overview of Piaget's theory, we now can examine the major trends that characterize his four hypothesized stages of development. To describe them as cleanly as possible, this discussion will generally avoid phrases such as "Piaget said," "Piaget believed," and "Piaget argued." These qualifying phrases should be understood to be implicit, since many of the claims are controversial. Before getting into the controversies, though, we need to understand what Piaget was saying.

The Stage Model

THE SENSORIMOTOR PERIOD (BIRTH TO ROUGHLY 2 YEARS)

Several years ago, at the first class meeting of a developmental psychology course Siegler was teaching, he asked each student to name the five most important aspects of intelligence in infancy, early childhood, later childhood, and adolescence. A number of students commented that they found it odd to describe infants as having intelligence at all. By far the most frequently named characteristics of infants' intelligence were physical coordination, alertness, and ability to recognize people and objects. Part of Piaget's genius was that he perceived much more than this. He saw the beginnings of some of humankind's most sophisticated thought processes in infants' flailings and graspings.

Piaget's account of the development of sensorimotor intelligence constitutes a theory within a theory. Infants are said to progress through six stages of intellectual development within a two-year period. (For clarity, we will refer to these as "substages" to distinguish them from the broader stages such as the sensorimotor and preoperational stages.) This might seem like too large a number of substages for such a brief time span, but when we consider that the brain of a 2-year-old weighs almost three times as much as that of a newborn, the number does not seem unreasonable. As a general rule, cognitive competence, like brain size, grows especially rapidly in the first few years.

Substage 1: Modification of reflexes (birth to roughly 1 month). Newborn infants enter the world possessing many reflexes. They suck when objects are placed in their mouths, close their fingers around objects that come into contact with their hands, focus on the edges of objects with their eyes, turn their heads toward noises, and so on. Piaget believed that these reflexes are the building blocks of intelligence.

Even within the first month after birth, infants begin to modify the reflexes to make them more adaptive. In the first days, they suck quite similarly regardless of the type of object in their mouth. Later in the first month, however, they suck differently on a milk-bearing nipple than on a harder, drier finger, and they suck differently on both of them than on the side of their hand. Thus, accommodation can be seen even in the first month out of the womb.

Substage 2: Primary circular reactions (roughly 1 to 4 months). By the second month, infants exhibit primary circular reactions. The term "circular" is used here in the sense of a repetitive cycle of events. The circles involve infants' actions, the effect of those actions on the environment, and the impact on the infants' subsequent actions of the effect of the earlier actions on the environment. Piaget (1954) provides the example of infants in their first few months trying to scratch and grasp all kinds of objects that they happen to touch: their mother's bare shoulder, the sheet folded over their blanket, their father's fist, and so on.

In primary circular reactions, if infants inadvertently produce some interesting effect, they attempt to duplicate it by repeating the action. If they are successful, the new instance of the interesting outcome triggers another similar cycle, which, in turn, can trigger another cycle, and so on.

These primary circular reactions are possible because Substage 2 infants begin to coordinate actions that originally were separate reflexes. In Substage 1, infants grasp objects that come into contact with their palms. They also suck on objects that come into their mouths. During Substage 2, infants put these actions together. They bring to their mouths objects that their hands grasp, and grasp objects with their hands that they are sucking on. Thus, the reflexes have already begun to serve as building blocks for more complex activities.

Primary circular reactions are more flexible than the earlier reflexes and allow infants to learn a great deal about the world. However, they also are limited in at least three ways. First, the 1- to 4-month-olds attempt to reproduce only the exact behavior that produced the original interesting event—they do not vary their behavior. Second, their actions are poorly integrated and have a large trial-and-error component. Third, they only try to repeat actions in which the outcome of the action involves their own bodies, as in sucking a finger.

Substage 3: Secondary circular reactions (roughly 4 to 8 months). In this stage, infants become increasingly interested in outcomes occurring beyond their bodies. For example, they become interested in batting balls with their hands and watching them roll away. Piaget labeled such activities *secondary circular*

reactions. Like all circular reactions, these activities are repeated over and over. Unlike the primary circular reactions, though, the interesting outcome (such as the ball rolling away) involves objects in the external world.

Between ages 4 and 8 months, infants also organize more efficiently the components of their circular reactions. Piaget described instances in which, after he started a mobile swinging, his children kicked their legs to continue the movement. As in the primary circular reactions, infants were only trying to reinstate the original interesting occurrence. However, they now could do so more efficiently. They reacted more quickly to the original event and wasted less motion.

At this point, it is tempting to conclude that infants understand the causal connection between their actions and the effects of their actions. Piaget was reluctant to credit them with this understanding, though. Rather, he thought that infants' activities were not sufficiently voluntary to say that they had independent goals. In his view, in the first month they do not form any goals, and between 1 and 8 months, they only form goals directly suggested to them by the immediate situation. Not until after 8 months do they form true goals, independent of events in the immediate environment.

Substage 4: Coordination of secondary circular reactions (roughly 8 to 12 months). Infants approaching 1 year of age become able to coordinate two or more secondary circular reactions into an efficient routine. When Piaget (1952) put a pillow in front of a matchbox that his infant son Laurent liked, the boy pushed the pillow aside and grabbed the box. In earlier stages, the infant would not have been able to combine the two activities of pushing the barrier out of the way and getting the matchbox.

This example also illustrates another major development that occurs as children approach their first birthday. They realize that if they act in certain ways, particular effects will follow. Thus, Laurent now understood that removing the pillow would allow him to grab the matchbox.

Especially important, Substage 4 brings with it the ability to form relatively enduring internal representations of the world. Out of sight is no longer completely out of mind. Thus, when objects disappear from sight, as when they roll behind a chair, infants pursue them, rather than acting as if the objects had disappeared from the world. This ability to form mental representations is an especially important development, because it lays the foundation for all further cognitive growth.

Substage 5: Tertiary circular reactions (roughly 12 to 18 months). With the onset of tertiary circular reactions, shortly before 1 year of age, infants transcend the remaining limits on their circular reactions. They actively search for new ways to interact with objects, and explore the potential uses to which objects can be put. As implied by the "circular reaction" label, they still repeat their actions again and again. Now, though, they deliberately vary both their own actions and the objects on which they act. Thus, the activities involve similar rather than

identical behaviors. The following description of Piaget's son Laurent conveys a sense of these new competencies.

He grasps in succession a celluloid swan, a box, etc., stretches out his arm, and lets them fall. He distinctly varies the positions of the fall. Sometimes he stretches out his arm vertically, sometimes he holds it obliquely, in front of or behind his eyes, etc. Then the object falls in a new position (for example on his pillow), he lets it fall two or three times more on the same place, as though to study the spatial relation; then he modifies the situation. (Piaget, 1951, p. 269)

These changes from primary to secondary to tertiary circular reactions show just how far infants come in the first year and a half. As shown in Figure 2.1, primary circular reactions, first seen between 1 and 4 months, involve repetitions of events whose outcomes center on the infants' own bodies, such as putting their fingers into their mouths. Secondary circular reactions, first seen between 4 and 8 months, again involve repetition of an event that by chance produced an interesting outcome, but the interesting outcome is at least slightly removed from the infants' bodies (such as the ball rolling away from them). Tertiary circular reactions, first seen between 12 and 18 months, involve the infant deliberately varying the behavior that produced the interesting outcome.

The changes embodied in these three types of circular reactions are useful for thinking about a broad range of developments in infancy. At first, infants' activities center on their own bodies; later, they increasingly center on the external world. Goals begin at a concrete level (dropping an object) and become increasingly abstract (varying the heights from which objects are dropped). Correspondence between intentions and behaviors becomes increasingly precise, and exploration of the world becomes increasingly venturesome.

Substage 6: Beginnings of representational thought (roughly 18 to 24 months).

Developments in this age range are transitional between the sensorimotor and preoperational periods. In the sensorimotor period, children can only act; they cannot form internal mental representations of objects and events. In the preoperational period, children can form such internal mental operations. Substage 6 is the transition point, in which internalized representations are first produced. Consider the following scenario involving Piaget playing with his daughter Lucienne. Piaget hides a watch chain inside an otherwise empty matchbox. Previously, he had left the matchbox open far enough that Lucienne could get the chain by turning over the matchbox, but now he closes it too completely for the chain to fall out. Lucienne

looks at the slit (in the matchbox) with great attention; then, several times in succession, she opens and shuts her mouth, at first slightly, then wider and wider! Apparently, Lucienne understands the existence of a cavity subjacent to the slit (in the matchbox) and wishes to enlarge the cavity. The attempt at representation which she thus furnishes is expressed plastically, that is to say, due to inability to think out the situation in words or clear visual images, she uses a simple motor indication (her open mouth) as "signifier" or symbol. (Piaget 1951, p. 338)

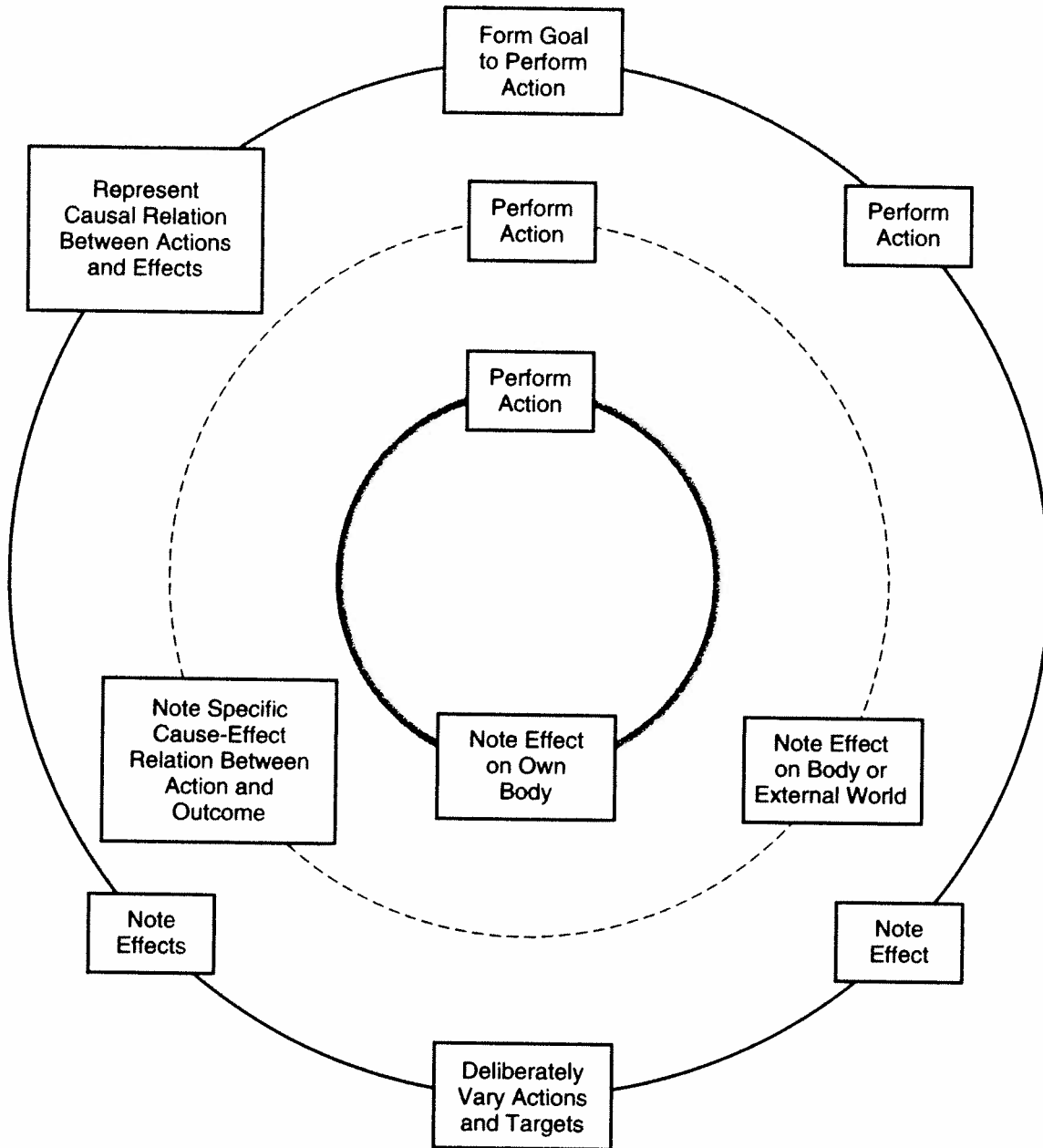


FIGURE 2.1 The child's expanding universe: primary (——), secondary (-----), and tertiary (——) circular reactions. Diagram best read by starting at top of each circle and proceeding clockwise.

As Lucienne opens her mouth, symbolizing her desire for the opening in the matchbox to become wider, we can almost see her internally representing the situation. That is, the representation is moving from her external actions to her mind. Such internalized representations are the hallmark of the preoperational period.