Equilibration

One concept that is not represented by the diagram in Figure 1.1 is that of equilibration. The word will not be used often in this book, but the idea to which it refers should be kept constantly in mind while studying Piaget's theory in subsequent chapters, for it was the inspiration for the theory in the first place and remains its overarching principle.

Equilibration is a function of every living system. It is a process of attaining equilibrium between external intrusions and the activities of the organism. From a psychological point of view, those activities may be conceived as strategies for maximizing gains of information and minimizing losses. Equilibration is a mechanism of change that operates over an extended period of time in a-developing child. To place it in proper perspective, it should be compared to another such mechanism: *learning.*

Behaviorists think of learning as the formation of associations. A response occurs in the presence of a stimulus, and a bond is formed such that henceforth when that stimulus is presented, that response will occur. Often there is an added requirement that the response be followed immediately by a special kind of stimulus called a *reinforcer*.

Although Piaget does not deny that such learning occurs, he has concluded that the fundamental process in learning is not association. He calls association "learning in the narrow sense," and is not much interested in it. What does interest him is a complex that includes maturation and a different kind of learning-a complex that he calls "development."

Possibly the most important difference between Piaget's developmental theory and traditional learning theory is that in addition to the gradual accretion of functional associations (isolated simple structures), Piaget's theory recognizes an intermittent *revision of established structures* -- a process that entails qualitative as well as quantitative change as higher-order structures (schemes) incorporate those of an earlier stage. The process by which structures are revised is called equilibration.

Equilibration is "coming into equilibrium." In classical physics, there are two kinds of equilibrium: static and dynamic. A balance scale with equal weights in the two pans is a system in static equilibrium, as indeed is any body at rest. In contrast, a thermostat is in dynamic equilibrium; so is a homeostatic biological system, a falling body after its acceleration has ceased, or any other system in which an interchange of forces maintains the system in a constant state. In Piaget's theory, equilibrium is dynamic; it is a system of compensating actions that maintain a steady state. That steady state is a condition of the system in which the internal activities of the organism completely compensate for intrusions from without. Because of the importance of states (stages) in his theory, Piaget has often seemed uninterested in mechanisms of transition from one state to another; but the concept of equilibration is concerned with just those transitions.

An example is the acquisition of *conservation of continuous quantity*. See Figure 1.2. The subject is presented with two identical beakers that have been filled to exactly the same level with fruit juice; one is identified as his, the other as the experimenter's. After the child has acknowledged that the amount of juice is the same in each jar, the experimenter pours the contents of one jar into a short, broad container and that of the other into a tall, thin one. "Now," he says to the child, "Do you have more to drink, or do I, or do we have the same amount?" If the answer is "same amount" the subject is said to have "conserved" the substance of the liquid. With respect to this problem, at least, his thinking is "equilibrated."

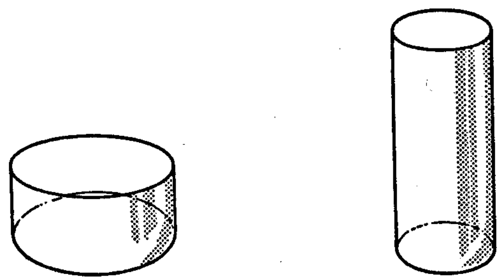

Figure 1.2

According to Piaget, this, like all equilibration processes, goes through four steps. In Step 1, the subject attends to only one dimension (usually the height), and he judges the tall drink to be the larger; he fails to "conserve" quantity. Repeated experiences with configurations that are similar but not identical, however (liquids poured into vessels of varying shapes, from vessel to vessel, and so on), eventually lead him to shift to the other dimension (in this case width). That shift is especially likely when the tall drink is constricted into a mere tube, for then its extreme thinness can hardly escape his attention, and he does indeed state that the tall drink is now the smaller of the two. "Focusing on the other dimension" is the second of the four steps of equilibration. The third step is a mixture of the first two-or rather, it is an alternation between them as the conditions of the display are changed. But that alternation, especially if it is rapid, provides the necessary condition of the fourth step, which is simultaneous attention to both height and width and their coordination into a mutually compensating system. Now when he is asked, "Which has more to drink?" he replies firmly, "They are the same." Notice that the outcome of all this is not a copy of external reality, but a way of dealing with it more effectively.

A child approaches any conservation problem with a strategy for obtaining information from it. But the more consistently he applies that strategy (Step 1), the clearer it becomes to him that it is inadequate; so he shifts to another strategy (Step 2). When the second strategy also fails, he vacillates between the first two (Step 3), which results eventually in a stable system (Step 4) that modifies each and includes both. Now he has information not only about changes in one dimension (such as the height of a body of liquid) or about changes in another (such as its width), but about both of those plus conservation of whatever remains the same (such as the quantity of the liquid) throughout all those changes. The last strategy will not itself disintegrate; but it does contribute to further change, for its very stability makes possible an awareness of inadequacies in larger systems of which it becomes a part.

Structures continually move toward equilibrium, and when a state of relative equilibrium has been attained, a scheme is sharper, more clearly delineated, than it had been previously. But the very sharpness points up inconsistencies and gaps in the structure that had never been salient before. Each equilibrium state therefore tarries with it the seeds of its own destruction, for the child's activities are thenceforth directed toward reducing those inconsistencies and closing those gaps. Equilibrium is always dynamic and is never absolute, but the product of each of the major units of development (Sensorimotor, Concrete Operations, and Formal Operations) is a relatively equilibrated system of actions-an *equilibrium* (equilibrated structure).