A Model of Mental Growth

Because teachers of composition and comprehension necessarily deal with the putting of thought into speech and the interpreting of speech into thought, they need a model of mental growth. They are not concerned with language alone. Problems of composition and comprehension have to be resolved *between* thought and speech as students try to match one with the other. The nature of language, moreover, influences thinking. The model of growth that educators choose makes a critical difference in how everyone involved thinks about learning.

The growth model assumed in much traditional schooling is based on nineteenth-century physics and the industrial assembly line. According to this mechanical model, an educated student is a "product" issuing from one end of a closed system into which he and some other inert materials were fed. Knowledge structures are assembled by putting small parts together to make subassemblies that are in turn put together to make the finished product. The upshot is that students can't see the woods for the trees. They are usually working on parts, without knowing why, and too seldom experience fully functioning communication in school. One falsity in this model is that in reality a child is more maker than made.

It's important, whatever the model, that it depict growth sequence as cumulative, not linear. Don't picture growth as a ladder or a series of stepping-stones, because these metaphors imply that learners leave behind old learning as they acquire new. Most learning is never shed but, rather, becomes assimilated or transformed into more advanced skills and knowledge. Imagine growth as a circle that becomes filled with more and more detailed and interfused figures.

Biology is the most appropriate field from which to draw a model of education, because mental growth parallels the growth of the total organism, in which it occurs. The best model of mental growth is the human embryo. It grows from a single cell to an extraordinarily intricate organism without ever being anything less than a whole and without ever functioning any other way than as a whole. A fertilized human egg is a human being before elaboration. What it is to become is already coded genetically within and will unfold through interaction with the environment. As the French expression says, "The more it changes the more it is the same thing"—that is, the more it fulfills what is has always been latently. It effects change by differentiating itself into limbs and organs, and it sustains itself across change by interrelating these parts by nerves and blood vessels as fast as they become articulated. The beauty of embryonic—and of mental—

development lies in the great biological principle of simultaneous *differentiation and integration.*

At birth the mind of a child is integral with the world, because it has never had to deal with the world. Just as the child's body partook of the mother's body its mind partook of surroundings with no consciousness of separation. Marvelous faculties of reason like classifying and inferring exist already in potential state but lie dormant, pending the environmental exchanges that will activate them.

Cut off from the mother the child begins to become conscious of itself. Thrust up against physical and social realities, the child begins to construct an ego to negotiate with the things and people it is now starting to feel separate from. Distinguishing one's organism from one's environment—perhaps the real trauma of birth—is the archetype of all differentiating. As it differentiates self from world, the child also differentiates the mind into thoughts that match the way the physical and social worlds are broken down. For safety and satisfaction, it has to learn to make distinctions to tell the difference between one thing and another. It learns to analyze, in other words, or, more accurately, its experience activates its inborn ability to analyze.

Humpty Dumpty's fall symbolizes this breakup of the egg's primal unity and simplicity into the inevitable differentiation an organism must undergo if it is to survive. The higher the animal the more its survival depends on acting differently toward different things—on flexibility—and hence the more it must differentiate its own insides into specialized parts. Growth means moving away from an initial lumping together, which in the mental realm some psychologists call global thinking. (Vestiges of it will hound students and teachers for years to come in the form of undiscriminated, undetailed, unrelated, unexplained ideas.)

Humpty Dumpty's problem is not that he broke himself down but that all the king's horses and all the king's men cannot put him back together again. The other half of growth is integration. As an *egg* Humpty Dumpty indeed cannot be put back together. An egg has to change into something else, and integrating new parts is actually *re*integrating. The differences emerging because of the breakdown must constantly be restructured. After a certain stage, nutrients no longer diffuse directly throughout protoplasm; gastrointestinal organs evolve to specialize in processing nutrients, and these organs must form a sequence among themselves, so that each does its job successively, and must form other appropriate relations with heart, lungs, brain, and so on to coordinate functions.

As the embryo must integrate the organs and vessels it articulates for fending and foraging in the environment outside the womb, the

mind must organize the concepts and statements into which it is breaking thought down for matching it to material and social realities. The mind must synthesize parts into wholes at the same time it analyzes the whole into parts. Brain research suggests, in fact, that one reason for the brain having two hemispheres is so that it can specialize in both functions at once. Usually the left hemisphere (in most right-handed people) undertakes to analyze and the right to synthesize. The more differences the mind distinguishes, the more relating it must conceive in order to coordinate the parts as a whole. The mind must see the unlikeness of things existing in their unique state of concreteness and yet see likeness among things as reordered out of time and space into the abstract realm of thought. In its original global state of mind, the child is no more aware of similarity than of difference, because perception of one depends on perception of the other. Analysis and synthesis together create the complexity, the higher organization, that characterizes growth.