Book Review

Wilson, Frank R. 1998. *The Hand: How Its Use Shapes the Brain, Language, and Human Culture*. New York: Panteon Books.

Geographic educators interested in more experiential approaches to learning will find much of interest in Frank Wilson's neurologic perspective on *The Hand.* There he examines what he calls the "hand-thought-language nexus" – the connection between object manipulation, the mediation of the brain, and the development of symbolic ways of communication. The role of the hand in learning is paramount in his inquiries. He presents evidence that the deeply personal creative impulse "...is a critical element at the core of all learning. It requires that information be gathered, ideas explored and tested, and decisions made so that progress can be made toward a personally valued goal." No object or action is automatically excluded so that the creative product could be a cabinet, a hot-rod engine, a painting, or indeed a map or other reconstruction of some spatial reality!

Wilson's time scale is anthropologic and biologic. In it he reviews a variety of research on social behaviors (such as grooming and tool making) among primates. Along with other obvious factors such as walking erect and evolving hand structure, these provided not only the incentive but also a stable context for symbolic interpersonal communication. The more complicated the tool manufacturing, the more complicated the language and social organization, over a long period of time. In this process, both the hand and the eye develop as sense organs through practice, which means that the brain *teaches itself* to synthesize visual and tactile perceptions by *making* the hand and eye learn to work together. Associated with this were changes in and growth of the brain.

But Wilson's goals are in the present by asking: "What might be the connection between tool use, language, and thinking during the span of a single human life?" "Could anything we have learned about the hand be used to improve the teaching of children?" He explores these questions with further reviews of research and in interviews with a number of people who have achieved very refined control of their hands: from back hoe operator to surgeon, from

magician to musician. In this he questions the premise that intelligence is a purely mental phenomenon, that the mind can be educated without the participation of the body.

He illuminates this dichotomy by considering intelligence itself as the capacity to discover, weigh, and relate facts in order to solve problems." In prehistory he notes that: "...improvisational problem-solving, and with it what we can begin to identify as intelligence, begins with monkeys, increases in apes, and..." so on. Bipedality also created unprecedented opportunities and dangers for the hominids moving away from the protection of the disappearing forest. Throughout this evolutionary sequence, there is evidence of increasingly varied use of the hand and to exploit its manipulative capabilities. In the present, a similar development begins in infancy before the baby can (or should) stand and walk, when the brain must develop and integrate a multisensory reference system to track limb movements on an ongoing basis. "The nervous system must know at all times where each hand is with respect to the midline..." "Inevitably, this same process helps to establish a coordinate system for external objects located in three dimensional space." In other words, this perspective regards the body as an extension of the mind.

As a result, he believes that these issues bring into relief a fundamental premise of Darwinian though, that structure and function are interdependent and co-evolutionary. The brain kept giving the hand new things to do and new ways of doing what it already knows how to do. In turn, the hand afforded the brain new ways of approaching old tasks and the possibility of undertaking and mastering new tasks. That means the brain, for its part, can acquire new ways of representing and defining the world. Is that not what Geography is all about?

The hand-mind connection also contributes to the development of language. Wilson considers the proposition that the human brain organizes and oversees the child's interactions with objects almost exactly the same way it organizes and oversees the production of speech. These two specific skills (manipulating objects and manipulating words), and the developmental chronology associated with the child's mastery of those skills, proceed in such transparently parallel fashion that the brain must be: (a) applying the same logic or procedural rules to both; and (b) using the same anatomic structures

as it does so. Thus "...the hand is involved form the beginning in the baby's construction of visuomotor, kinesthetic, and haptic representations of the world and the objects in it."

Obviously all this supports the general notion of geography as an experiential science (and geographic education as a process of personal discovery) rather than the mastery of a bounded set of facts and figures. In particular, it would suggest quite different introductions to basic geographic concepts – activities that can bridge the gap between what children see and what they are taught. This would seem especially so, in light of the previous paragraph, for the topics of orientation and position in geographic curricula which are often introduced with the abstractions of cardinal directions and latitude and longitude.

Wilson acknowledges the need to learn other manipulating skills, but he contends that the historic role of the hands in the acquisition of knowledge and skill during the apprenticeship remains and continues to feed the dynamic processes of the imagination. In one example, he makes reference to a senior geographical-research designer who still works regularly with a pencil and paper – tools that, ironically, he considers more interactive than the computer, because they force him to think implications through. He also reports that Hewlett-Packard rarely hires people who are predominately computer experts, favoring instead those who have a talent for teamwork and are flexible and innovative. Hewlett-Packard is such a believer in hands-on experience that since 1992 it has spent $2.6 million helping forty-five school districts build math and science skills the old fashioned way – using real materials, such as dirt, seeds, water, glass vials, and magnets. Recruiters in film and computer-game animation share much the same perspective. They see a certain "...stiffness or a flatness, a lack of richness and depth" in work by artists who have spent a lot of time on computers. "With traditional art training, you train the eye to pay attention to body movement. You learn attitude, feeling, expression." In geographic education, we have the opportunity in designing symbols to consider the essential attributes of objects, ideas and actions, and their representation – activities which enhances these same hand-mind connections.

From his studies of surgeons, he notes manual dexterity is not the major dimension distinguishing proficient from mediocre

surgical performance. Rather, it is the ability to rapidly analyze and organize perceptions based on multisensory information, to "see" the relevant anatomy of the operative site, to quickly identify important "landmarks" in the incision; and to mentally organize multisensory data and actions at any given point of the procedure so as to allow a smooth and efficient sequence of responses." It is hard not to associate these perceptually based cognitions about complex spatial information with our experiences in reading landscapes and analyzing various spatial images.

Wilson warns that sitting our children in front of computers when they are three years old may be misplaced if it assumes that they can then skip the "pointless" experiences of childhood during which they find out what a baseball, or a puppet, or a toy car, or a swing can do to their body, and vice versa." He wonders how the fully computerized kid may turn out when they have replaced haptics with vision as the primary arbiter of reality and have substituted virtual baseball of the old fashioned kind – all this at an age when the brain's sensorimotor system hasn't settled on the time constraints it will use for its own perceptual-motor operations.

According to Wilson, "The clear message from biology to educators is this: The most effective techniques for cultivating intelligence aim at united (not divorcing) mind and body." And, he reminds us, "Intelligence, the capacity for innovative response to the world, is also an aspect of the entire organism." "The brain does not live inside the head, even though that is its formal habitat. It reaches out to the body, and with the body it reaches out to the world." The basic inquisitiveness of the human mid serves the fundamental desire of the human to establish meaningful relations between himself or herself and the world, and (intrinsic to that process) to "put his or her personal stamp on some aspect of the surround." This seems a most useful basis for any pedagogy.

Henry W. Castner is Emeritus Professor of Geography, Queen's University, Canada.