



HAND-MIND COORDINATION

The Hand: How Its Use Shapes the Brain, Language, and Human Culture

Frank R. Wilson

New York, Pantheon Books; 1998, 416 pages, \$30.00

In 1833 Sir Charles Bell published his Bridgewater Treatise, *The Hand, Its Mechanism and Vital Endowments as Evincing Design*. This was followed nearly a century later by Frederick Wood Jones's *The Principles of Anatomy as Seen in the Hand* (1920). Both wrote eloquently of the human hand, its phylogenetic development, its intimate dependence upon the brain, and, more philosophically, of its role in making man unique and superior among vertebrates. The writings of Bell and Wood Jones point out the changes in cortical representation (Hughling Jackson's term) in phylogenetic progress and the increase in conscious movements over reflex action. The hand has a large share of cortical representation, as you will remember from the homunculus. Higher animals moving from quadrupedal dependence to bipedal upright stance had the forelimbs liberated, and thus their end piece, the hand became the great testing member of the body.

Now, less than a century after Wood Jones's publication, Frank Wilson has published an excellent expansion and supplement to Bell and Wood Jones in his book, *The Hand: How Its Use Shapes the Brain, Language, and Human Culture*. It is a fifteen-chapter book with a comprehensive bibliography and appendix and an epilogue that is a call to action for educators.

Wilson extols the hand under central nervous system control for its ability to carry out both gross, rough, heavy tasks, as well as delicate, fine, light touch tasks of micro precision. The anatomical engineering and architectural principles that allow infinite adaptability of man's hand are obviously useless without the precise coordinated control by the brain and

nervous system of the more than sixty muscles involved in upper limb movement. This highly complex central control depends heavily upon feedback through muscle, tendon, and joint sense coupled with touch sensibility from the skin's specialized sense organs. This to-and-fro information exchange emphasizes the connection of hand and brain. Wilson makes the case for the connection being a two-way one, with each terminal affecting development and refinement of the other. He describes the hand as a cognitive organ, comfort to a surgeon who in today's lexicon is not considered to be in one of the so-called "cognitive" specialties. Wilson points out that the most effective technique in educational development is that of uniting body and mind. He sees the hand as representing the body in this context. He contends that attempts to develop intellectually using mind alone (as for example in pure computer learning) cannot hope to match "hands on" (literally) experience as part of a program of education.

Dr. Wilson, in his position as director of the Peter F. Ostwald Health Program for Performing Artists at the University of California School of Medicine in San Francisco, has had considerable experience in analyzing and treating hand problems in musicians. He expands by citing work such as that of Plotkin and his theory of "secondary heuristics," which Wilson describes as "novel behavior or adaptive strategies invented to meet unpredictable demands presented by the particular environment encountered by each individual." The adaptability of man's hand and, further still, the repetitively practiced, brain-recorded, unique adaptation for unique manipulation by various experts are cited by Wilson. His personal experience with a German marionettist, a juggler, a surgeon, musicians, a mountain climber, and a magician constitute interesting examples. Thus, an individual with curiosity and ideas often implements them through his hands. The resulting achievements are gained through melding of hand and brain and this may be the key to a fulfilling and successful life.

Dr. Wilson makes the case for the importance of the hand in language de-

velopment. He quotes Harlan Lane, a psychologist, who upon observing sign language stated that "it meant that the brain had the capacity for language, and if you can't put it through the mouth, you put it through the hands." It is here that, as Sax put it, in relationship to development, "movement and sensation together become the antecedent of meaning."

The book addresses right- and left-handedness, the importance of fourth and fifth carpometacarpal motion, thumb mobility, upper limb range of motion, and psychosocial influences in disabled hand function. He defines these attributes as elements unique to man. The numerous topics discussed are beyond what a brief review can describe and are best experienced by reading this landmark treatise.

Robert A. Chase, M.D.

(*AMA, Yale University School of Medicine, 1947*)

*Department of Surgery and Anatomy
Stanford University
Stanford, California 94305*

Correction:

Incorrect references are given in several of the figure legends in Brody H, Vinten-Johansen P, Paneth N, Tip MR. John Snow revisited: getting a handle on the Broad Street pump. *Pharos Winter 1999; 62 (1): 2-8.*

Figure p. 2: Legend: Cholera deaths in London, July-October 1854. Adapted from Paneth N, Rip M, Brody H, Vinten-Johansen P. A rivalry of foulness: John Snow and the public health response to the cholera epidemic of 1854. *Am J Publ Health 1998; 88: 1545-53.* Data taken from General Board of Health. Report of the Committee of Scientific Inquiries in relation to the cholera epidemic of 1854. London: Her Majesty's Stationery Office; 1855.

Figure p. 5: Legend: Plan of relationship between cesspool at Number 40, Broad Street, and the pump. From: Cholera Inquiry Committee, St. James Parish. Report on the cholera outbreak in the parish of St. James, Westminster, during the autumn of 1854. London: J. Churchill; 1855.

Figure p. 6: Legend: Arthur Hill Hassall's drawing of "vibriones" in the rice-water stools of cholera victims. From: General Board of Health. Report of the Committee of Scientific Inquiries in relation to the cholera epidemic of 1854. London: Her Majesty's Stationery Office; 1855.