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The Hand and the Brain: From Lucy's Thumb to the Thought-Controlled Robotic Hand

Göran Lundborg

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This book presents the human hand from an overall perspective – from the first appearance of hand-like structures in the fins of big fishes living millions of years ago to today´s and the future's mind-controlled artificial hands.

Much focus is given to the extremely well-developed sensation of the hand, its importance and its linkage to brain plasticity mechanisms. How can active hands rapidly expand their representational area in the brain? How can the sense of touch substitute for other deficient senses, such as in Braille reading where hand sensation substitutes for missing vision? How can the mere observation of active hands, belonging to others, activate the hand area in the observer's own brain and what is the importance of this phenomenon for learning by imitation and the understanding of other peoples' actions, gestures and body language? Why are some of us left-handed and what are the consequences from cultural and physiological viewpoints? Why does phantom sensation and phantom pain occur after hand amputation, and what can we do about it? Why can salamanders regenerate new extremities while humans can not? Is it possible to transplant a hand from a diseased individual to an amputee? Can artificial robotic hands be controlled by our mind, and can they ever gain the role of a normal hand? What role did the hand and the brain play during evolution in tool construction and development of language and cognitive functions? The hand has a high symbolic value in religion, literature and art and our hands have a key role in gestures and body language.

The Hand and the Brain is aimed at anybody with interest in life sciences, in the medical field especially hand surgeons, orthopaedic specialists, neurologists and general practitioners, and those working in rehabilitation medicine and pain treatment. The original Swedish version of *The Hand and the Brain* has also become very popular among physiotherapists, occupational therapists, psychologists, and among a general population with an interest in science.

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