

Using the hand as a focus, examines evolution of body, brain, tools, music and language

This book is organized in two major parts. The first three chapters discuss the evolution of the hand and the centrality of the hand in human evolution. The remaining chapters introduce the reader to a wide range of fascinating people that Frank Wilson has known throughout his life and who have given him insights into the amazing versatility of the hand.

The three chapters on evolution are worth summarizing. They offer a significant number of insights that are not found elsewhere but are intuitively appealing.

We are not the only land animals to have learned to walk on our hind legs, and not the only ones to have found other things to do with the front legs. Tyrannosaurus rex let them atrophy. Squirrels use them to hold nuts. Kangaroos put them to some use or another. But most significantly, our monkey and ape ancestors have found them increasingly useful for other purposes. Human beings are the only primates to walk exclusively on their hind legs, freeing up the front legs for other purposes.

Monkeys use their hands to grab food and feed themselves. Their hands are extremely well adapted for climbing and jumping around in trees. Monkeys developed binocular color vision, a fair amount of flexibility in their arms, and brains capable of planning and executing sophisticated moves with their hands.

Apes moved from the tops of branches to underneath them, swinging rather than climbing. This brachiation involved some evolution in their shoulders which has served humans well. It also let heavy bodied animals climb higher into the trees, where the food was.

During this long evolution a thumb emerged distinct from the other four digits. It was different, but not yet in a position to coordinate with the other fingers to hold things. As Wilson says, apes are equipped to pick up suitcases, but they can't pick up a baseball with a thumb and fingers.

The last common ancestor between human beings and our closest ape relative, the chimpanzee, appears to have lived about 7 million years ago. Since that time the world has experienced a series of ice ages. Jungle habitats shrunk repeatedly, and our ancestors were forced out onto the open savanna. Wilson uses Lucy, the Australopithecus discovered by the Leakeys, an anthropoid who lived 3.9 to 4.2 million years ago as his frame of reference. Lucy's brain was about the same size as that of the chimpanzee, but her body had changed significantly from that of apes.

Most significantly, Lucy was a full-time biped. Her hands were free. Her legs had evolved significantly; she needed to move quickly to avoid predators and to catch a meal on the open savanna. Her shoulders and arms had also evolved. She was able to use an overhand motion to throw rocks. The ability to throw stones was undoubtedly useful for keeping predators at bay and killing other animals for food. She still did not, however, have a fully modern human hand. In particular her hand was not suited for wielding a club. Its musculature did not allow the thumb to be placed alongside a stick and oppose the ring and pinky finger in a powerful grip.

Rock throwing is done with only one hand, and it takes a lot of practice. Wilson hypothesizes that this is the time in which handedness (favoring righties 9 to 1) came to be strongly expressed in the human genome. Tool use would drive it further, with one hand holding the work object and the other hand holding a tool to craft the object at hand.

Homo erectus evolved the ability to hold tools. Oldowan stone axes date back as far as 2 ½ million years were created by people holding the stone to be formed in one hand (usually left) and chipping flakes off with another stone held in the right. It required some evolution of the musculature, and evolution of the wrist bones to endure the constant pounding. One of the strengths of the book is the generous and informative illustrations of how bones and muscles evolved to meet the new tasks they faced throughout the course of evolution.

Human brains evolved quickly about the time that tools came into use. There are several different theories as to why this happened, all of which probably have some validity. The size of the communities grew, necessitating the intelligence to manage broader networks of relationships. Individuals became more specialized. Toolmaking is a craft. The brain evolved to control the increasingly useful hand and arm. There was almost certainly more cooperation in the hunt.

The need for communication grew for several reasons. The increased size of the tribe, the need to coordinate more complex activities, and the need to teach culturally acquired skills. The surprise is that language did not appear until very late in the game, perhaps 150,000 to 200,000 years ago. This suggests that our anthropoid ancestors must have made extensive use of gesture, by hand and facial expression, probably accompanied by utterances that were not yet symbolic language but nonetheless useful in communication.

Wilson discusses the structure of the brain, and the close relationship between the portions that control the hands and those that deal with language. Intelligent, social animals such as Homo erectus had to be able to communicate effectively in order to manage in the complex societies that they had developed. Wilson's theory is that spoken language, using audio tokens as symbols, is simply a much faster way to communicate than pantomime.

To summarize the first three chapters, and the book in general, the hand has played a central role in every aspect of human evolution. The shoulder, arm and hand saw significant evolution even as the size of the brain grew very little. Then, as hands became more adept, tools came into use in society grew more complex, the brain exploded in size to its present 1.5 liters.

The rest of the book focuses on the extraordinarily varied uses of the hand, and some extraordinarily talented practitioners in each of the areas mentioned. Wilson himself has a very broad range of interests and acquaintances. In his professional life he is a surgeon who deals with problems of the hand, especially those of musicians. The stories he tells of people in different professions emphasize how integral the hand is to the human animal. We are not simply creatures of intellect.

One of the take-home points for this father of young children is how important it is for children to spend a lot of time creating things with their hands. Painting, sawing and nailing, cooking and so on. Even at the time this book was written, in the late 1990s, it was clear that children were succumbing more and more to the allure of computers and video entertainment. Wilson's strong advice would be not to do it. We learn by doing, and we do with our hands.

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