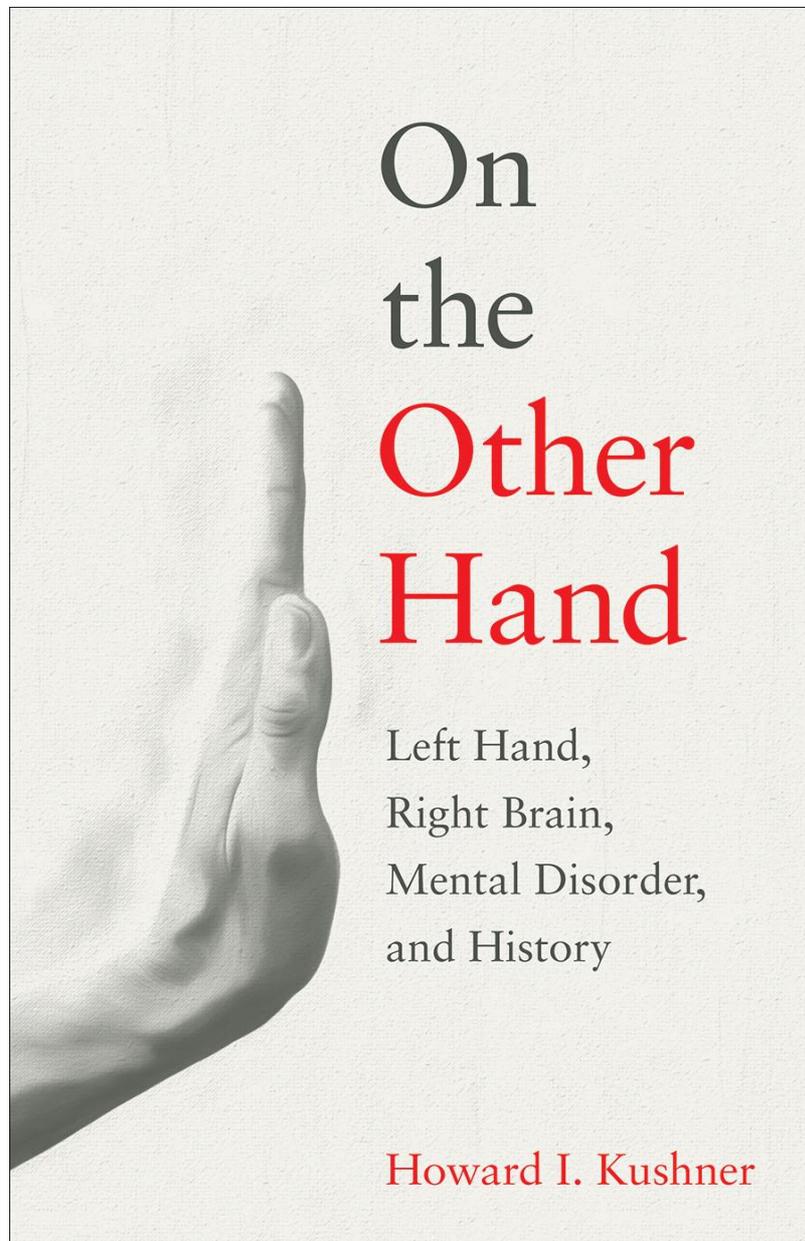


Howard I. Kushner's *On the Other Hand: Left Hand, Right Brain, Mental Disorder, and History*

Review by Lesley J. Rogers, D.Phil., D.Sc.



Editor's Note: After a distinguished career as a professor at Emory University and San Diego State University, this left-handed author—whose mother was also a southpaw—examines left-handedness in the context of studies that have contested the classifications and meanings of disability, forcing researchers to re-examine their assumptions and attitudes about disability while challenging public policies aimed at them.

In this interesting and highly informative book, Howard Kushner brings together a wealth of information on handedness in humans, including research into its possible causes, and past and present attitudes to left-handedness. He examines the evidence of possible associations between left-handedness and, variously, psychosis, creativity, homosexuality, and stuttering.

Failing to find a consistent association between, for example, left-handedness and schizophrenia, many research studies have lumped left-handed subjects together with those without significant hand preference to form a group referred to as “non-right-handed” or “atypical hand dominance,” then compared them to right-handed subjects. Kushner finds fault with this practice, proposing that any significant associations it finds are marred by “vagueness and plasticity and most likely can be made to fit the behavior of a segment of any population.” Ambi-preferent (mixed-handed) subjects, he argues convincingly, should be examined as a group separate from left- and right-handed groups. I agree, since absence of a consistent hand preference might reflect weak or no brain asymmetry, and research on humans and animals suggests that, on some tasks, such subjects perform differently from those with brain asymmetry regardless of its direction (left or right).

As Kushner rightly points out, measurement of hand preference varies across studies and needs to be standardized. I suggest that it would be useful to include, in studies of hand preference, other measures of asymmetry (e.g., eye or ear preference). New techniques of neuroimaging offer promise in conjunction with other measures of asymmetry, including handedness.

On the topic of hand preferences in humans, the book gives a very fair, sometimes enlightened account of both historical and contemporary views and findings. Chapter 10, for example, takes to task the efforts to link left or non-right handedness to homosexuality by pointing out inconsistencies between studies and the pitfalls of lumping together results from those that have used different criteria of measurement. What, asks Kushner, explains the persistence of researchers’ seeking a connection between left-handedness and homosexuality? His answer is, “Its connection with the stigmatized left-hand seems ‘natural.’ ” The same applies to claimed associations between left-handedness and either disability or ability, as discussed in chapter 11.

The book begins with a brief discussion of asymmetry in non-human species. Kushner writes, “...there is no agreement about whether the brains of [non-]human primates, let alone other species, are asymmetrical and lateralized to the same extent as humans.” Until discoveries of asymmetry in the brains of birds and rats were made in the 1970s and 1980s, it had been thought that lateralization of brain function was a unique characteristic of humans, underpinning our superiority as a species. As more and more evidence of lateralization in diverse vertebrate species accumulated, supporters of the human-uniqueness of this trait were forced to give ground. But they did so only partially, by claiming that lateralization is strongest in humans.

Kushner adheres to this view. But is it correct? Based on hand preferences in primates, it certainly seems so: in many species, for any given task, some individuals prefer the left hand and others the right (e.g., in marmosets). Recent evidence on hand preferences in chimpanzees shows right-hand preferences in coordinated bimanual tasks, but in most tasks their hand preferences are not as strong as in humans. However, Gillian Forrester and colleagues published a study on context-dependent hand preference in gorillas, which showed right-hand preference for touching inanimate objects and left-hand preference for touching animate targets, such as self and social partners, and a similar pattern of hand preference in human children.

But hand preferences are just one indication of brain asymmetry, and a rather crude one at that. Marmosets, for example, show a significant right-eye preference to view food and they do so irrespective of their hand preference. This result suggests that their asymmetry of sensory processing is as strong as humans, even though this is not reflected in hand preferences. It is possible that this and many other species of primate show no population bias for left- or right-hand use because this characteristic is not subjected to social pressures, as it is in humans.

In fact, left-handed primates differ from right-handed ones in tests of cognitive bias—the tendency to interpret ambiguous stimuli as positive or negative—and in their responses to novel situations. Even left-pawed dogs differ from right-pawed ones in having a more negative cognitive bias. These results suggest that limb preference in nonhuman species reflects a general tendency to use the hemisphere contralateral to the preferred limb (right hemisphere for negative emotions and left hemisphere for positive emotions). Kushner makes no mention of the association between hand preference and cognitive bias, although it would have been relevant to the theme of the book.

Looking further into limb preferences with a preferred direction in the population, researchers have found that many species of parrots and cockatoos show footedness. Almost all sulfur-crested cockatoos have a preference to hold food and other objects in their left foot, as strong an asymmetry as the right handedness of humans. Toads also show both hind- and fore-limb preferences. In fact, limb preferences at the individual level are rather common in vertebrates, and have even been reported to occur in invertebrates. But whether a population bias for either left or right limb preference is present depends on task constraints. Hand preference is not always a reliable proxy for brain lateralization.

Kushner makes some mention of the research on laterality in animals in Chapter 1 but, disappointingly, limits this to a recent report of hand preferences in marsupials, which he cites incorrectly as featuring left-forelimb preference in red tree kangaroos. Andrey Gilov and colleagues, in fact, scored hand preference in a range of kangaroo species performing a variety of behaviors and, although they found some species (e.g., eastern grey and red kangaroos) to have significant left-handedness, red tree kangaroos appeared to have none. Indeed, the latter observation was central to the researchers' demonstration that only bipedal species (as opposed to quadrupedal tree-living species, such as the red tree kangaroo), have limb preference.

Such an incorrect citation so early on colored my view of the book, but I was willing to set it aside until I reached chapter nine, which disappointingly recounted the view of hand preference, and lateralization in general, as being amongst primates strongest in humans and paying no attention to the body of evidence for limb preferences in other species. However, Kushner is clearly on strong ground when he covers hand preferences in humans.

As the book discusses, historical stigmatization of left-handers (discussed comprehensively in early chapters of the book) has now found its way into scientific research. Although there is nothing amiss with formulating hypotheses and testing them objectively, there is much wrong with prejudiced views, which are often subliminal, distorting research methods and interpretation of results.

The strengths of this book are, in fact: the way in which the author explores the intersection of scientific method and beliefs about hand preference, and in explaining how this frequently leads to poor experimental procedures and biased conclusions.

Bio

Lesley Rogers, D.Phil., D.Sc., is emeritus professor at the University of New England in Armidale, Australia, and a Fellow of the Australian Academy of Science. She received a Doctor of Philosophy and a Doctor of Science at the University of Sussex, UK. Her publications include 18 books and over 270 scientific papers and book chapters, mainly in the field of brain and behavior with a focus on development and lateralization in animals. Her discovery of asymmetry of brain function in chicks was among the first showing that brain asymmetry is not unique to humans and, together with two other publications, it founded the now active field of research concerned with brain and behavioral asymmetry in animals. Her research has been published in *Science*, *Nature*, *Current Biology*, *Biology Letters*, *Animal Behavior*, *Advances in the Study of Behavior*, and *Brain Research*. Her most recent books are: *Rogers, Vallortigara and Andrew (2013) Divided Brains: The Biology and Behavior of Brain Asymmetries* (Cambridge University Press) and *Rogers and Vallortigara (eds) Lateralized Brain Functions* (Humana Press). She has received a Special Investigator Award from the Australian Research Council, an Australian Centenary Medal, the Clarke Medal from the Royal Society of New South Wales, and election as a Corresponding Fellow of the American Ornithologists' Union.