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Book review

Stanislas Dehaene, Jean-René Duhamel, Marc D. Hauser, Giacomo Rizzolatti (Eds.), From Monkey Brain to Human Brain: A Fyssen Foundation Symposium, MIT Press, Bradford Books, Cambridge, MA, 2005, xvii + 400 pp. $55.00 (hardback), ISBN 0-262-04223-1.

The macaque brain has long served as a model for the study of cortical function and organization and is consequently among the best known in all mammals. Although increasing appreciation of mammalian cortical diversity has carried us beyond the ''model animal'' approach, macaque studies remain central to the development of a proper comparative framework. *From Monkey Brain to Human Brain* makes many important contributions to this endeavour, and is particularly timely given recent interest in the primate ''mirror system'' of action understanding as a potential precursor to human imitative and language capacities. The discovery of mirror neurons through single unit recording in behaving monkeys also exemplifies another central motivation behind macaque research, which is the opportunity to perform experiments that cannot ethically be done with humans. Readers should be aware at the outset that much of the research presented in this book involves highly invasive and/or fatal procedures, and they should form their own views on the ethical issues involved. In the future, fMRI techniques such as those described in the chapter by Kourtzi & Logothetis may provide researchers with a greater array of non-invasive options.

From Monkey Brain to Human Brain constitutes the proceedings of a Fyssen Foundation symposium held in June 2003, and the book brings together an impressive array of leading researchers in a truly interdisciplinary effort. This is only to be expected from the Fyssen Foundation – a leader in supporting research on cognitive evolution which has previously sponsored highly successful symposia on brain evolution and on tool use, among others. The proceedings are organized into five sections, beginning with thematically-defined sections on comparative research methods and on putative human ''prerogatives'' (numerical cognition, altruism and Theory of Mind), and followed by anatomically-defined sections addressing parietofrontal action systems, frontal and cingulate cortices, and visual areas of the temporal lobes. Papers range from accessible overviews to fairly demanding research reports, and, while there is something here for everyone, the volume will probably be of most interest to those with at least some neuroscience background. A wealth of interesting and high-quality research is presented in this book, and only a brief sample may be touched on here.

Perhaps the most basic question to be addressed in a book like this is how the human brain differs from those of other primates. It is humbling to realize that, aside from matters of overall size, there is relatively little known on this subject. In this respect, chapters by Van Essen and Zilles on the use of surface based registration and elastic deformation for interspecies comparisons are of particular interest. These are promising new approaches, although, as Van Essen properly emphasizes, they remain dependent on the validity of the cortical landmarks employed.

The combination of these methods with comparative studies of cyto- and receptor architecture illustrated by Zilles represents an important direction for future research. Zilles' finding of ''considerable reorganization'' in posterior parietal cortex (PPC) is particularly interesting in light of prior palaeoneurological attention to the region and because PPC figures prominently in discussions of numerical cognition (Nieder & Miller; Dehaene), imitation learning (Rizzolatti & Buccino), tool use (Iriki), and selective attention (Wardak, Hamed & Duhamel) presented elsewhere in the book. It is only unfortunate that these intriguing connections could not be developed more fully.

In fact, my sole criticism of *From Monkey Brain to Human Brain* is that opportunities for synthesis are not always exploited to the extent they might be. For example, Changeux discusses ''activity-dependent epigenesis of neuronal networks'' and Deheane develops a very interesting hypothesis of evolution through neuronal ''reconversion,'' but neither is compared with Iriki's similar proposal that tool-use training in monkeys induces the expression of ''silent neurogenetic mechanisms.'' Similarly, Hublin provides a nice summary of palaeoneurological evidence of expansion in PPC and Broca's area, but does not explicitly relate this to discussions of PPC organization by Zilles and Luppino or to the language evolution scenario of Rizzolatti & Buccino. Obviously, synthesis is a problem for conference proceedings in general, and it should be pointed out that some connections, such as those between numerical cognition and altruism (Stevens & Hauser), are better developed. Nevertheless, expansion of the preface or addition of editorial introductions to each section could have added to the value of the book, especially for general readers.

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With that said, *From Monkey Brain to Human Brain* is clearly a definitive book that incorporates trend-setting work by major researchers in the field. It will be an important reference for all those with a serious interest in human brain evolution.

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