

PREFACE

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For a rise of comparative cognitive science

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Naïve perception may tell us that the Earth is flat and the Sun revolves around the Earth. However, careful observation of the complex movements of planets, by Nicolaus Copernicus (1473–1543), Galileo Galilei (1564–1642), Johann Kepler (1571–1630), and other astronomers, has brought true understanding. The Earth is round and it revolves around the Sun. This is called the Copernican revolution, or the turning point from belief in the Ptolemaic system to the Copernican system.

We, humans, arrived at this true understanding in the 16th century. At present, almost all of us recognize that the Earth is round, not flat, paying little attention to our naïve perception. In a sense, it took about 400 years for us to overcome our naïve perception and accept the scientific truth.

The evolution of living organisms by natural selection was first postulated by Charles Darwin (1809–1882) and his contemporaries in the 19th century. Darwin's book *On the Origin of Species by Means of Natural Selection* was published in 1859. This discovery is one of the most important additions to our world-view. It took about 150 years for us to gradually accept the scientific understanding of our relatedness to animals, which contradicts our naïve perception in which monkeys, cats, dogs, and ourselves look different from each other.

The fossil record and recent progress in DNA analysis clearly show us that we, *Homo sapiens*, are one of the various living species on the Earth, sharing the common origins of life. All living organisms have survived within the c. 3.5 billion years of the history of life on this planet. The genetic difference between humans and chimpanzees, their closest evolutionary neighbors, is estimated to be about 1.7%. Humans and chimpanzees shared a common ancestor about 5 million years ago. This means that the two

species have shared a common thread of existence over more than 99.8% of evolutionary history. However, many people still think of chimpanzees as “big black monkeys”, based on their naïve perception. They simply look different from us. It may take some more years for us to fully recognize that humans and chimpanzees share a common ancestor and should be put together in a group of “hominoids”, that includes humans and apes, and that should be contrasted against the group of “monkeys” such as Japanese macaques.

Human cognition and behavior are as much products of evolution as the human body. However, “mind” cannot remain in the bone and dental fragments of fossil hominids. One way to trace the evolutionary process through which it has emerged is by comparison with other living species. Cross-species comparisons of this sort constitute a royal road in biology when studying evolutionary processes responsible for traits arising in morphology, physiology, behavior, and also psychology. Comparing living species can be a fruitful approach in the domain of understanding the evolutionary origins of human cognition and behavior: that is a new discipline called “comparative cognitive science” (Matsuzawa 2001). For the purposes of this discipline, we need to explore a broad range of species including humans and nonhuman primates, and also other mammals, birds, and even invertebrates. Someday in the future, a true scientific understanding of human nature in an evolutionary perspective will overcome the presently prevailing dichotomy between “humans” and “animals” supported by naïve perception.

This special issue of *Animal Cognition* is one of the two volumes of Proceedings resulting from a Center of Excellence (COE) International Symposium on “Phylogeny of Cognition and Language” held in Inuyama, Japan, 2–5 March 2000 (Fig. 1; Tomonaga and Matsuzawa 2001). The other volume was published in a special issue of the journal *Psychologia: An International Journal of Psychology in the Orient* (published quarterly by the Psychologia Society, e-mail: psysoc@www.educ.kyoto-u.ac.jp). The symposium was financially supported by the Ministry of Education, Science, Sports and Culture of Japan.

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Fig. 1 Plenary speakers of the Center of Excellence (COE) International Symposium on *Phylogeny of Cognition and Language* held in Inuyama, Japan, 2–5 March 2000. *Left to right, front row:* Julie S. Johnson-Pynn (Berry College, USA), Masako Jitsumori (Chiba University, Japan), Joël Fagot (CNRS, France), Edward A. Wasserman (University of Iowa, USA), Shozo Kojima (PRI, Kyoto University, Japan), Tetsuro Matsuzawa (PRI, Kyoto University, Japan), Dorothy M. Fragaszy (University of Georgia, USA), Robert G. Cook (Tufts University, USA), Richard W. Byrne (University of St. Andrews, UK), Charles T. Snowdon (University of Wisconsin, USA), *middle row:* Lori Markson (MIT, USA), Fei Xu (Northeastern University, USA), Deborah M. Custance (University of London, UK), Masako Myowa-Yamakoshi (PRI, Kyoto University, Japan), Elsa Adessi (Institute of Psychology, CNR, Italy), Tatyana Humle (University of Stirling, UK), Maura Lucia Celli (PRI, Kyoto University, Japan), Dora Biro (University of Oxford, UK), Claudia Sousa (Coimbra University, Portugal), Lisa A. Parr (Emory University, USA), Hideko Takeshita (Shiga Prefectural University, Japan), *back row:* Noboyuki Kawai (PRI, Kyoto University, Japan), Yutaka Kosugi (Kyoto University, Japan), Tessei Kobayashi (University of Tokyo, Japan), Duncan L. Castles (University of Tokyo, Japan), Satoshi Hirata (PRI, Kyoto University, Japan), Brian Hare (Harvard University, USA), James R. Anderson (University of Stirling, UK), Shoji Itakura (Oita University of Nursing and Health Sciences, Japan), Kazuo Fujita (Kyoto University, Japan), Shigeru Watanabe (Keio University, Japan), Masaki Tomonaga (PRI, Kyoto University, Japan), Kazuo Okanoya (Chiba University, Japan). Missing: Iver Iversen (North Florida University, USA)

The symposium was based on the idea of creating a comparative cognitive science, and had a threefold purpose. It aimed to provide a rare opportunity for interaction among researchers from different disciplines: interactions between researchers of human ontogeny versus phylogeny, of primates versus non-primate animals, and from the East and the West.

First, we invited researchers interested in human cognitive development. The word “infant” originally means

“unable to speak”. Human infants can be characterized by not being able to speak, much like nonhuman animals. No verbal instruction is possible and no verbal responses can be expected in studies of human infants. These constraints are somehow shared with studies of nonhuman animals. Developmental studies of human cognition have therefore been able to contribute suggestions to the comparative study of cognition and behavior in nonhuman animals, and vice versa. The ontogeny of mind will illuminate the phylogeny of mind, and vice versa.

Second, we invited researchers who specialize in the study of various kinds of species. There seems to be a dichotomy between primate studies and non-primate ones in the area of animal cognition. Non-primate studies, dealing mainly with rodents and birds, have paid much attention to the common learning mechanisms among living species. In other words, they have focused on an analogical aspect of the evolutionary process by which evolutionarily remote species can develop apparently similar cognition and behavior. On the other hand, primate studies have dealt with closely related species, including humans, and have tried to clarify a homological aspect of evolutionary process. The two different approaches should be complementary to each other.

Third, we invited researchers from the West to meet researchers from the East. It is not well known that Japan is the only country among the so-called advanced countries (such as “Summit” members), that has indigenous monkeys, *Macaca fuscata*, known as snow monkeys. There are no native monkeys at all in North America or Europe. Japanese people are raised with folklore and fairy tales that give an important role to monkeys. This special affection of ordinary people towards monkeys in general seems to have promoted the development of primate studies in Japan.

The late Kinji Imanishi (1902–1992) of Kyoto University took the lead (Imanishi 1941). In 1948 Imanishi and colleagues went to Koshima island to study wild Japanese monkeys. That resulted in the finding of the cultural propagation of “sweet-potato washing” (Hirata et al. 2001). The study still continues. There is a chronological record over 53 years of seven generations in a wild population. Ten years later, in 1958, Imanishi and his colleagues went to Africa to start the socio-ecological study of African great apes in the wild. In short, the study of primates in Japan started with field work from the beginning, later followed by laboratory work. This is just the reverse of the Western tradition of the discipline: for example, take the case of chimpanzee researches. Names such as Robert Yerkes (1876–1946) and Wolfgang Koehler (1887–1967) were followed by Jane Goodall (1934–). These different traditions may to some extent be reflected in the present style of research.

We invited young researchers early in their careers as well as established ones. This mixture was really effective in stimulating the interactions described above. We very much hoped that all participants would use this opportunity to gain an overview of evolutionary approaches to

cognition and behavior in humans and nonhuman animals, to learn about their colleagues, and to enjoy the early buds of spring in Japan. It is our great pleasure to see this special issue of *Animal Cognition*, which is the outcome of such pleasant interactions. We would like to share the fruits with the readers of this journal. Without the support of Dr. Tatiana Czeschlik, Chief Editor, we could not have reached this point. We are grateful for her encouragement and patience in becoming a bridge to a non-English-speaking scientific community.

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