Editorial: A brief note on the historical background of the study of cognition and behavior in nonhuman primates by Japanese researchers

Japan is a special country from the view point of primatology. Why? Because Japan has an indigenous primate species (*Macaca fuscata*), known as snow monkeys, and there are also many primatologists. The living nonhuman primates are distributed in Africa, Asia, and Central and South America, although there are very few primatologists in these developing countries. On the contrary, there are no native monkeys in Europe and North America, although there are a lot of primatologists. Japan is the only exception, as it has both native monkeys and many native primatologists.

Monkeys do not appear in Aesop's fables, *Grimm's Fairy Tales*, or Mother Goose's nursery rhymes. There are foxes, rabbits, bears, and geese playing important roles in these tales, but no monkeys. In Japan, monkeys are one of the favorite characters of folklore and fairy tales. Most Japanese people have had a chance at some time in their life to see wild monkeys feeding on the ground, playing in the trees, or bathing in hot springs. This special affection of ordinary people for monkeys seems to have supported the development of primatology in this country.

In Japan, the study of nonhuman primates began with the socio-ecological study of Japanese monkeys in their natural habitat. The late Dr. Kinji Imanishi (1902–1992) of Kyoto University led in the promotion of socio-ecological studies by developing original research methods such as long-term observation by provisioning[1] and individual identification. His school was called the "Kyoto school" and has produced many world-renowned primatologists, such as Drs. J. Itani and M. Kawai. The preliminary survey of wild Japanese monkeys started in 1948. Itani and others succeeded to provision the wild monkeys on Koshima island in 1952. Potato-washing behavior by the monkeys is a well known example of cultural (or precultural) behavior in nonhuman animals discovered at Koshima (Itani & Nishimura, 1973; Kawai, 1965).

The socio-ecological research was concentrated on the study of social structure and leadership of the group, life history in each gender, and so on. The study of the cognition and behavior of these monkeys has been neglected. Of course, there are a few exceptions. For example, Itani (1963) examined vocal communication of wild Japanese monkeys and described the details of vocal behavior. This was later followed by ethological studies using more refined techniques to study vocal communication in Japanese monkeys (Masataka, 1983) and also other species, including humans (Masataka, 1986, 1992).

With the accumulation of knowledge on wild Japanese monkeys, Imanishi and Itani first stepped into Africa in 1958 and started the socio-ecological study of African great apes – gorillas and chimpanzees. Thereafter, Dr. T. Nishida succeeded to provision the wild chimpanzees (*Pan troglodytes*) in the Mahale Mountains, Tanzania, East Africa in 1967. He and his colleagues have continued this study, now in its third decade (Nishida, 1990). Dr. Y. Sugiyama and his colleagues also continue a longitudinal study of chimpanzees, almost two decades long, at Bossou, Guinea, West Africa (Sugiyama, 1994). Dr. T. Kano started his research on wild bonobos (pygmy chimpanzees, *Pan paniscus*) at Wamba, Zaire, in 1973. He and his colleagues revealed much about

[1] Feeding monkeys in the wild to let them habituate to human observers for close observation and identification of each individual.

the life of "the last ape," and continue to do so even now, after more than two decades of research (Kano, 1992).

In the shadow of socio-ecological study, the study of cognition and behavior of nonhuman primates has not been widely recognized. However, there has been a stream of effort by Japanese psychologists over the years, using two different approaches. The first is the psychological approach in collaboration with socio-ecologists. For example, the memory span of wild monkeys was tested in their natural habitat by a delayed response task in the early 1960s. In the "sand digging test", peanuts were buried to a depth of 6–7 cm in sand and then a monkey was prompted to dig up the peanuts (Tsumori, Kawai, & Motoyoshi, 1965). Unfortunately, since then, there have been very few attempts at such "field experiments" regarding the cognitive ability of nonhuman primates (Higuchi, 1992; Matsuzawa, 1994; Matsuzawa, Hasegawa, Gotoh, & Wada, 1983). Dr. Itoigawa and his colleagues of Osaka University started their socio-ecological studies of wild Japanese monkeys in the 1950s (Itoigawa, 1973). They have extended their efforts to psychological studies of social behavior in captive groups of monkeys.

The second approach is an experimental one in the laboratory setting. A typical setting involves keeping a single subject in a cage and testing various aspects of its cognitive ability by giving it a discrimination task. Most of the so-called experimental psychologists have adopted this approach. The experimental approach is universal by nature, so that the Japanese approach should not differ from that of America or elsewhere. The socio-ecological study of nonhuman primates by Japanese researchers was much influenced by traditional Japanese attitudes, whereas the approach of experimental psychology is less influenced by culture. In a sense, Japan has tried to catch up with the advanced countries by directly importing research themes and methods. The experimental approach to cognition of nonhuman primates by Japanese psychologists can be traced back to the 1940s.

Dr. B. Yagi and his colleagues of the University of Tokyo might be considered to be the first researchers testing the cognitive ability of monkeys in the laboratory. Yagi (1948) tested monkeys in a string pattern test, in which they had to pull the string attached to a food reward. For example, two strings in front of the subject were crossed and one of them was baited. In this case, the monkey needed to be careful to choose the right string because the strings were crossed. Since then, many Japanese psychologists have challenged various issues of the cognitive ability of nonhuman primates.

It is not the purpose of this brief historical sketch to describe all the experimental approaches used by Japanese psychologists to understand the cognitive ability and behavior of nonhuman primates. It is impossible to review all the papers because their numbers are rapidly increasing year by year. To summarize the main research trends, let us first think about why nonhuman primates are used in the laboratory for psychological studies. There used to be three reasons: to understand general rules of learning, the brain's mechanism, and the evolution of cognitive functions. Research based on the first one has become less common since we have became aware of the biological constraints on learning.

The brain mechanism has been examined with the application of invasive techniques such as ablation, insertion of electrodes, microinjection of chemical substances, and so on. This study area is directly related to neuroscience. The number of studies using unanesthetized monkeys has increased since the 1970s in Japan (Kubota & Niki, 1971; Niki, 1974).

Understanding of the evolution of cognitive functions has been improved by comparing species. Among mammals the order primates has the unique characteristics of color vision and binocular depth perception. Therefore, the evolutionary change of their perception has been studied in terms of animal psychophysics. Dr. T. Oyama and his colleagues were pioneers in this field in Japan (Oyama & Jitsumori, 1973, for carp; Jitsumori, 1978, for pigeons) and examined color vision in macaques (Oyama, Furusaka, & Kito, 1986). Not only visual perception, but also auditory perception has been examined in chimpanzees in order to know more about the hominization of

vocal-auditory communication (Kojima & Kiritani, 1989; Kojima, Tatsumi, Kiritani, & Hirose, 1989). The ape language studies have focused on clarifying the evolutionary perspective of human language. An ape language project in Japan started in 1978 under the leadership of Dr. K. Murofushi at the Primate Research Institute of Kyoto University (Matsuzawa, 1985). It continues almost two decades later.

The approach to cognition in nonhuman primates can provide an evolutionary perspective on human cognition. This research area has recently grown to become a branch of the cognitive sciences, called comparative cognitive science. New research techniques have been developed, such as the application of sensory reinforcement in species recognition among five species of macaques (Fujita, 1987) and utilization of a visual search paradigm for the comparison of visual information processing between chimpanzees and humans (Tomonaga, 1993).

This special issue does not cover all contemporary research, but each paper helps us to understand important aspects of cognition and behavior in nonhuman primates. In this brief note, we decided to cite English publications only. We think it is not fair to omit the enormous number of Japanese publications in the early years of the study, especially the pioneer works by distinguished Japanese researchers. However, this journal aims to communicate scientific achievements to psychologists all over the world. For this reason we have limited the references to English publications only, for the sake of English readers. We hope that this brief editorial note on the historical background of the study of cognition and behavior will have helped to start you on your way to understanding contemporary research in Japan and that the papers in this special issue will inspire future research in this important field.

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