

Short report

A note on the responses of chimpanzees (*Pan troglodytes*) to live self-images on television monitors

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Abstract

The majority of studies on self-recognition in animals have been conducted using a mirror as the test device; little is known, however, about the responses of non-human primates toward their own images in media other than mirrors. This study provides preliminary data on the reactions of 10 chimpanzees to live self-images projected on two television monitors, each connected to a different video camera. Chimpanzees could see live images of their own faces, which were approximately life-sized, on one monitor. On the other monitor, they could see live images of their whole body, which were approximately one-fifth life-size, viewed diagonally from behind. In addition, several objects were introduced into the test situation. Out of 10 chimpanzees tested, 2 individuals performed self-exploratory behaviors while watching their own images on the monitors. One of these two chimpanzees successively picked up two of the provided objects in front of a monitor, and watched the images of these objects on the monitor. The results indicate that these chimpanzees were able to immediately recognize live images of themselves or objects on the monitors, even though several features of these images differed from those of their previous experience with mirrors.

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1. Introduction

Great apes can use a mirror to inspect areas of their body not visible without the aid of the mirror, suggesting that they have the capacity for self-recognition, although evidence is limited in gorillas (Inoue-Nakamura, 1997). Since the pioneering work by Gallup (1970), many studies have examined mirror behavior in many species of primates and other animals, including elephants and dolphins (Itakura, 1987; Povinelli, 1989; Marino et al., 1994).

The majority of the studies of self-recognition in animals have been conducted using a mirror as the test device (Anderson, 1984). Little is known about non-human primates' responses toward their own image in media other than a mirror (see Anderson, 1999 for a review). Law and Lock (1994) reported that gorillas respond differently to live-videotapes of self versus delayed videotapes of self and others. Savage-Rumbaugh (1984) provided a descriptive report of two chimpanzees, who

had had much experience in watching TV programs and live events happening elsewhere in their facility on TV monitors, beginning to show signs of self-recognition on a monitor. The two chimpanzees investigated the image on the monitor by making unusual facial gestures, moving their tongues, lips, hands, and feet, and holding various body postures. One of the two chimpanzees investigated the inside of its throat by opening its mouth in front of the camera, and the other chimpanzee painted its face with red pigment while watching the monitor. These descriptions clearly indicate that the chimpanzees are able to recognize images on a monitor recorded with a live-video camera; however, quantitative data, including the duration of live-video exposure and latency to their first self-exploratory behaviors, are not presented in this report.

Another study showed that chimpanzees can use the live image on a video monitor to locate an otherwise hidden object (Menzel et al., 1985). Poss and Rochat (2003) also showed, in a slightly different experiment, that chimpanzees and one orangutan were successful in finding a reward hidden in one of two areas when they were able to view the hiding event on a video monitor. Eddy et al. (1996) described that chimpanzees responded differently to a self-image in a mirror versus a videotaped image of other chimpanzees.

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A live image on a monitor has several features that are different from a reflection in a mirror (Savage-Rumbaugh, 1984). First, the left–right orientation in a video image is the opposite of that in the reflection in a mirror. Second, by placing the video camera at various angles, live images of the body from angles other than the front can be shown easily on a monitor. Third, the sizes of the images on a monitor can be magnified or reduced more easily, and to a greater extent, than can those of mirror images.

In this study, the reactions of chimpanzees to live self-images on television, with the above-mentioned features, were investigated; this was part of a pilot study to examine the possibility of using video media to investigate self-recognition in chimpanzees. Two television monitors were set up; each connected to a different video camera. One monitor showed a live image of the scene in front of the monitor, particularly the face or head of the chimpanzee facing the monitor. The left–right orientation in this monitor was the reverse of the reflection in a mirror. The other monitor was connected to another video camera, filming a wide view from the opposite side of the room. When a chimpanzee sat in front of the monitor, its whole body, as viewed diagonally from behind, appeared on the monitor. In addition, several objects were introduced to assess recognition of the relationship between the real objects and those appearing on the second monitor.

2. Materials and methods

2.1. Subjects and housing conditions

The subjects were 10 adult chimpanzees (*Pan troglodytes*) at the Primate Research Institute of Kyoto University, Inuyama, Aichi, Japan. There were three males (Gon, 32 years; Akira, 22 years; Reo, 16 years) and seven females (Puchi, 32 years; Ai, 22 years; Mari, 22 years; Pendesa, 21 years; Chloe, 18 years; Popo, 16 years; Pan, 15 years). Before this experiment, some of the chimpanzees had taken part in various experiments on perception and cognitive capacities (see Matsuzawa, 2003 for a review). All of the chimpanzees live together in an outdoor compound containing a semi-natural enriched environment, with a rich social life that included interactions with conspecifics and humans. The chimpanzees were fed various fruits and vegetables three times a day. Water was freely available, and the chimpanzees were never food deprived.

2.2. Mirror experiences of the subjects

Detailed quantitative data for the subjects on the frequency and duration of past experiences with mirrors were unavailable owing to a lack of written records; however, the following offers a brief outline of past mirror experiences (Matsuzawa et al., pers. commun.). Popo, Reo, and Pan were exposed to mirrors about once per month for tests of cognitive development from shortly after birth until 1 year of age. After that, they had been shown mirrors a few times a year during daily contact with human caretakers and researchers. Ai, Akira, Mari, Pendesa, and Chloe had been shown mirrors a few times a year during daily contact with

human caretakers and researchers since their arrival at the Primate Research Institute (Ai, 1 year; Akira, 1.5 years; Mari, 1.5 years; Pendesa, 2 years; Chloe, 4 years). Gon and Puchi were kept as pets by private individuals until they were 10 years old, and there was no information whether they had seen mirrors during this period. These two chimpanzees received no mirror exposure after their arrival at the Primate Research Institute, but like the other chimpanzees they could see reflective surfaces such as stainless steel walls of their housing facility in their daily lives. The sizes of mirrors shown to the chimpanzees varied, but a portable mirror about 30 cm × 40 cm was used in many of the cases. Evidence of mirror self recognition is available only for Ai and Chloe (Matsuzawa, 1991). They were seen to investigate teeth or eyelids while watching mirrors, and they passed a mark test similar to that of Lin et al.'s (1992) procedure. There was no record of self-recognition behaviors, i.e., self-directed or self-exploratory behaviors, during mirror exposure, for the remaining individuals (Popo, Reo, Pan, Akira, Mari, Pendesa, Gon, and Puchi), but the author had occasionally seen Puchi rubbing her head while watching the reflective surfaces of an outdoor experimental room in the chimpanzees' enclosure.

2.3. Apparatus and materials

A 20 m² polygonal playroom was used for the test. The room had transparent walls made of polycarbonate panels. Two 14 in. (35 cm) color monitors (monitors A and B) were placed side by side outside the playroom, facing a transparent wall panel. The height of the monitors was adjusted using pedestals to the eye level of the chimpanzee sitting in front of the monitor. Video camera A was fixed on top of monitor A and the picture-output was connected to monitor A. Video camera B was fixed in front of another transparent panel, approximately 3 m away from monitor B at an angle of 135°, and connected to monitor B. When a chimpanzee sat in front of the monitors, camera A filmed its face or head, and the live picture appeared on monitor A; camera B filmed its whole body diagonally from behind and this image was shown on monitor B. The size of the face or head appearing on monitor A was roughly life-size; that of the body on monitor B was approximately one-fifth life-size. The reason for the arrangement of these sizes is that the camera filming the back was adjusted so that the whole body, from the bottom to the top, would appear on the monitor to make the form of the body image well recognizable from the back, which resulted in approximately one-fifth life-size. The other camera filming the face or head was zoomed out at maximum, yielding an image of the face or head approximately life-size on the monitor when the chimpanzees sat in front of the camera. A 30 cm × 45 cm mirror was used to test for mirror self-recognition. The mirror was placed in approximately the same position as the two monitors used for the above-mentioned test. Seven objects were introduced to the testing situation to encourage manipulation in front of the monitors and the mirror. These objects were: a 10 cm high plastic cup, a 25 cm long plastic rake, a 30 cm long plastic scoop, a plastic plate 15 cm in diameter, a plastic pin 10 cm long, a pigtail brush 30 cm long, and a 10 cm × 17 cm piece of cloth.

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