

# Self-Recognition in Primates

## *A Comparative Approach to the Bidirectional Properties of Consciousness*

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**ABSTRACT:** *A technique is described in which organisms are provided with extended exposure to mirrors and then given an explicit test of self-recognition (accomplished through the unobtrusive application of marks to facial features visually inaccessible without a mirror). Use of this procedure with chimpanzees and orangutans turns up striking evidence of self-recognition, with patterns of self-directed behavior emerging after only 2 or 3 days. In support of the widely held view that the self-concept may develop out of social interaction with others, the capacity for self-recognition in chimpanzees appears to be influenced by early social experience. To date, however, attempts to demonstrate self-recognition in all other species except man have failed. The phyletic limits of this capacity may have important implications for claims concerning the evolutionary continuity of mental experience.*

Consciousness has always been an elusive topic in psychology. As a working hypothesis, however, it seems reasonable to suppose that there can be at least two dimensions to conscious experience. The basic distinction is between having an experience and being aware of having an experience. In this sense, human consciousness is typically bidirectional. In effect, most people can direct their attention outward or inward. Not only can I be consciously aware of events in the world around me, but I can become the object of my own attention. I can contemplate my own death. My brain can think about my brain and even speculate about the mechanisms of its own functioning. This reflective dimension of consciousness is isomorphic with self-awareness. In other words, the bidirectional

properties of consciousness translate into *consciousness* and *self-consciousness*.

To be able to think about oneself presupposes a sense of identity, and for some time man has been held unique in his capacity to form a self-concept (e.g., Ardrey, 1961; Black, 1968; Buss, 1973; Kinget, 1975; Lorenz, 1971). By being able to contemplate his own existence, man is in the seemingly unique and certainly precarious position of being able, at least in principle, to take steps to modify that existence. In fact, one widely respected evolutionary biologist (Slobodkin, in press) sees the development of self-awareness as having emancipated man from some of the otherwise deterministic and unrelenting forces of evolution.

The history of science, however, can be viewed in part as having brought about gradual changes in man's conception of man, and with such changes man may eventually have to relinquish, or at least temper, his claim to special status (e.g., Gallup, Boren, Gagliardi, & Wallnau, in press). Primate research poses one of the greatest contemporary threats to traditional notions about man.

### *Men and Great Apes*

In a recent article based on a comprehensive review of biochemical and immunological evidence, King and Wilson (1975) conclude that the "average human polypeptide is more than 99 percent identical to its chimpanzee counterpart" and that the genetic distance between humans and chimpanzees is so small that we are at least as similar to them as sibling species of other animals are to one another. King and Wilson note that the major anatomical and behavioral differences between chimpanzees and man seem paradoxical in light of these data. While anatomical differences obviously do exist, growing evidence casts doubt on man's behavioral uniqueness. In fact, after reviewing the

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psychological literature on primates, Mason (1976) concludes that "the essential terms of our uniqueness have yet to be defined."<sup>1</sup>

Many cherished notions of human uniqueness have become increasingly suspect, especially as a consequence of what we now know about the mentality of the great apes, which include chimpanzees, orangutans, and gorillas. For example, contrary to preconceived anthropological notions about man as a tool user or even tool maker, it is now known that chimpanzees living in the wild use and fabricate tools in ingenious and strikingly hominoid ways (see Beck, 1975). Also, unlike many other primates, not only do chimpanzees eat meat, they are more than mere opportunistic predators. Teleki's (1973) work shows that male chimpanzees engage in cooperative hunting, and meat is one of the few foods chimpanzees are willing to share. Male-oriented, cooperative hunting patterns that terminate in sharing have been held to be a hominoid hallmark and an evolutionary precursor to the development of modern man.

Chimpanzees also seem capable of learning to use various nonvocal forms of language in ways that parallel language development in both deaf and speaking children (Fouts, 1974; Gardner & Gardner, 1969; Linden, 1974; Premack, 1971; Rumbaugh, Gill, & von Glasersfeld, 1973). Since chimpanzees can learn to use the functional properties of language, this puts us in a peculiar predicament. To view language as the distinguishing feature of man means that now we either have to redefine language or redefine man, just as Leakey once said of tools. Implicitly faced with this choice, many people seem to be opting for the former rather than the latter alternative (e.g., Mounin, 1976). Although the controversy that has arisen over the existence or nonexistence of language in chimpanzees may eventually improve our understanding of language, it is not clear that it will have the same effect on our thinking about man.

One of the most interesting by-products of language training with chimpanzees is that, contrary to the linguistic relativity hypothesis, language does not seem to provide the animals with any radically new concepts. Language simply gives them a means of expressing what they already know (Premack & Premack, 1972) or what Menzel

(1973) calls "the apparent evolutionary independence of representational ability and verbal language." There is increasing evidence that thinking-like processes in the great apes antedate language. Recent examples include the work of Davenport and Rogers (1970) with chimpanzees and orangutans on cross-modal perception (or the ability to integrate and equate sensory input across several modalities) and the ingenious work of Menzel (1975) on the possible existence of a natural language among chimpanzees.

One of the last substantive holdouts for human uniqueness is self-awareness. In fact, there is a deep-seated feeling among some psychologists that consciousness and self-awareness are simply not amenable to objective study in other organisms. According to Klüver (1933), the content of experience or of consciousness itself is not a reasonable object of scientific study, since "scientifically they do not and cannot exist." Similarly, Gardiner (1974) claims that

Unfortunately, there is no way to interview animals to discover the exact point on the evolutionary scale at which consciousness emerges. Neither is there any way to determine when "self" becomes an element within the subjective map. (p. 207)

### *Mirror-Image Stimulation*

A few years ago, however, I did a study with chimpanzees and mirrors that reflects on this problem. My interest in mirrors can best be described in terms of what I have called *mirror-image stimulation*, which refers specifically to a situation in which an organism is confronted with its own reflection in a mirror. Many organisms react to such stimulation as if they were seeing another animal, and they engage in species-typical social responses directed toward the reflection (Gallup, 1968). However, this is no ordinary social encounter. If you think about it, when an animal first sees himself in a mirror, he will be seeing an animal with facial features he has never seen before. In other words, a mirror ought to simulate the presence of a stranger, and indeed the initial reaction often consists of responses that would be made to unfamiliar conspecifics. Mirror-image stimulation also has incentive properties for many species (Gallup & McClure, 1971; Thompson, 1964), and animals will learn to make instrumental responses in order to gain brief visual access to their own reflection. Some animals even appear to show a peculiar preference for viewing mirrors instead of other members of their own species (e.g., Gallup, 1975).

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<sup>1</sup> Although man clearly has the cortical balance of power, Yeni-Komshian and Benson (1976) report temporal lobe asymmetries in chimpanzees, but not rhesus monkeys, that are similar to those found in the human brain.

Another point about mirrors, and probably the most obvious for humans, is that they provide a potential source of information about the self. Mirrors enable visually capable organisms to see themselves as they are seen by others. In front of a mirror an animal is literally an audience to its own behavior. Since the observer's behavior dictates the behavior of the reflection, there is always a potential basis for predicting and controlling what the reflection will do. The image never initiates a social encounter. It never reciprocates. It only mimics the observer. Yet, for some curious reason, most animals seem incapable of recognizing the dualism inherent in such stimulation, and even after prolonged exposure to mirrors they fail to discover the relationship between their own behavior and the reflection of that behavior. This inability bears on a distinction between self-sensation and self-perception. Mirror-image stimulation for an animal constitutes self-sensation. Although ostensibly stimulated by themselves, most organisms persist in showing other-directed rather than self-directed behavior in response to the reflection. When looking at themselves in mirrors, animals react as though they were seeing other animals. Humans, however, are capable of self-perception in the sense of using mirrors for grooming and purposes of self-inspection. Whether self-sensation translates into self-perception depends on *self-recognition*.

### *Self-Recognition*

As far as humans are concerned, the available data show that self-recognition is learned. For example, people born with visual defects, who later undergo operations that provide normal sight, initially respond to mirrors as if confronted with another person and react to mirror space as though it were real (von Senden, 1960). Infants often show other-directed behaviors as well and are notorious for responding to mirrors as playmates. Although imperfect, recent studies indicate that children do not begin to show signs of self-recognition until they approach 2 years of age (Amsterdam, 1972; Schulman & Kaplowitz, in press). On the other hand, some profoundly retarded children, adolescents, and even comparably handicapped adults seem totally incapable of recognizing their reflections (Boulanger-Balleyguier, 1964; Harris, 1977; Pechacek, Bell, Cleland, Baum, & Boyle, 1973). It is also curious to note that prolonged mirror gazing has been associated with the onset of schizophrenia

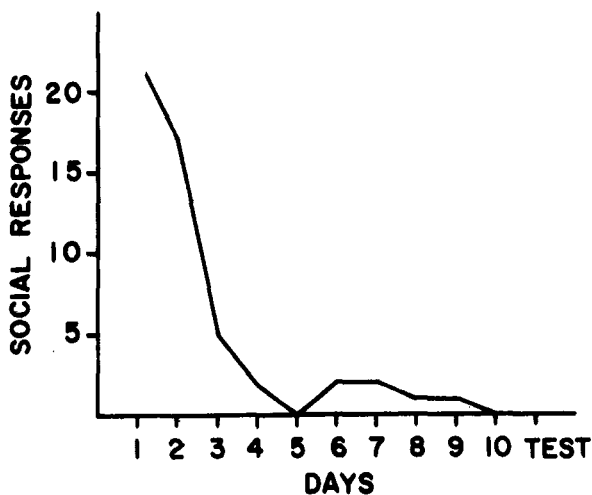


Figure 1. Number of time-sampled social responses directed to the mirror by chimpanzees over days. (From "Chimpanzees: Self-Recognition" by G. G. Gallup, Jr., *Science*, 1970, 167, 86-87. Copyright 1969 by the American Association for the Advancement of Science. Reprinted by permission.)

in man (Abély, 1930; Delmas, 1929; Ostancow, 1934). In fact, some schizophrenics appear to have lost their capacity for self-recognition (Faure, 1956; Traub & Orbach, 1964; Wittreich, 1959) and react as if in the presence of another person.

Aside from the fact that most of us are probably given explicit verbal instructions by our parents about the identity of the reflection, the ability to recognize one's own image would seem to be partly a function of prolonged confrontation with mirrors. After all, mirror surfaces, at least in this culture, are an everyday part of the human experience. Maybe if animals were given the same opportunity for extended self-inspection, they might also come to recognize the dualism implicit in such surfaces.

To test this conjecture, I gave a number of wild-born, preadolescent chimpanzees individual exposure to a full-length mirror for 10 days (Gallup, 1970). During that period, each subject was kept in a small cage in an otherwise empty room to insure enforced self-confrontation. Figure 1 depicts the average incidence of time-sampled social responses or other-directed behaviors made in response to the mirror. The only behaviors scored as other-directed were those that would be typically made in the presence of another chimpanzee (e.g., bobbing, vocalizing, threatening, etc.). Although this was the predominant behavior initially, the tendency to treat the reflection as a companion tended to wane over days. Other-directed responses

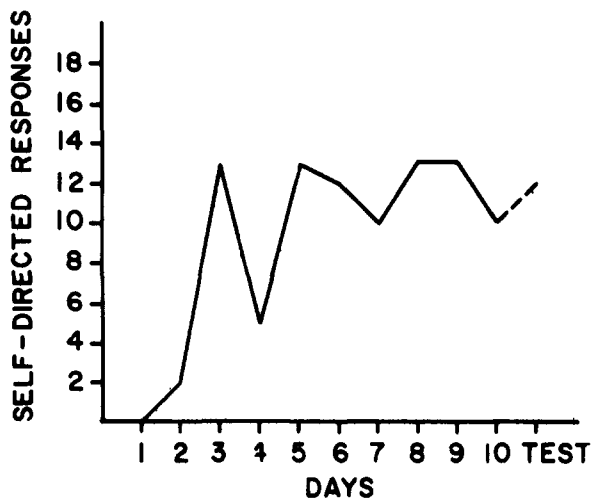


Figure 2. Number of time-sampled self-directed responses made while watching the mirror over days. (From "Chimpanzees: Self-Recognition" by G. G. Gallup, Jr., *Science*, 1970, 167, 86-87. Copyright 1969 by the American Association for the Advancement of Science. Reprinted by permission.)

were replaced by a self-directed orientation (see Figure 2). Rather than respond to the mirror as such, after the second or third day the chimpanzees began to use the mirror to respond to themselves. Under conditions of self-directed responding, they used the reflection to gain visual access to and to experiment with otherwise inaccessible information about themselves (e.g., grooming parts of the body that could not be seen directly, picking bits of food from between their teeth, blowing bubbles, making faces at the mirror, etc.). Figure 3 shows the average amount of time spent viewing their own reflections during 30-minute recording sessions each day. Prior to the development of self-directed behavior, all the animals showed considerable visual attention to the mirror, but with the emergence of a self-directed orientation, this interest subsided.

These patterns of self-directed behavior implied that the subjects had correctly identified the source of the reflection. However, I was concerned that others might not be terribly convinced or enamored with my subjective interpretations. In an attempt to clarify and objectify these impressions, an unobtrusive and more rigorous test of self-recognition was instituted. Following the last day of mirror exposure, each chimpanzee was anesthetized and the mirror was removed. When the animal was unconscious, I proceeded to paint the uppermost portion of an eyebrow ridge and the top half of the opposite ear with a bright red, odorless, nonirritat-

ing, alcohol-soluble dye. The animal was then placed back into its cage and allowed to recover in the absence of the mirror. The significance of this procedure is threefold. First, the chimpanzees had no way of knowing they had been marked, since the procedure was accomplished under deep anesthesia. Second, the dye (Rhodamine B-base) was carefully selected because of its complete lack of tactile and olfactory properties, as determined by applying it to my own skin several days prior to testing. Finally, the marks were strategically placed at predetermined points where it would be impossible for the animals to see them without a mirror.

Following recovery, the subjects were directly observed in the absence of the mirror to determine the number of times any marked portion of the skin was touched "spontaneously." The mirror was then reintroduced as an explicit test of self-recognition. The results are shown in Figure 4. As evidence for self-recognition, the number of mark-directed responses, or attempts to touch a marked area on themselves through visually guided mirror feedback, increased by a factor of over 25 times in the presence of the mirror. In terms of the chimpanzees' perceptions of their own facial features, over twice as many attempts were made to touch the marked eyebrows as compared to the ears. Not only did the incidence of mark-directed behaviors increase upon exposure to the mirror, but so did

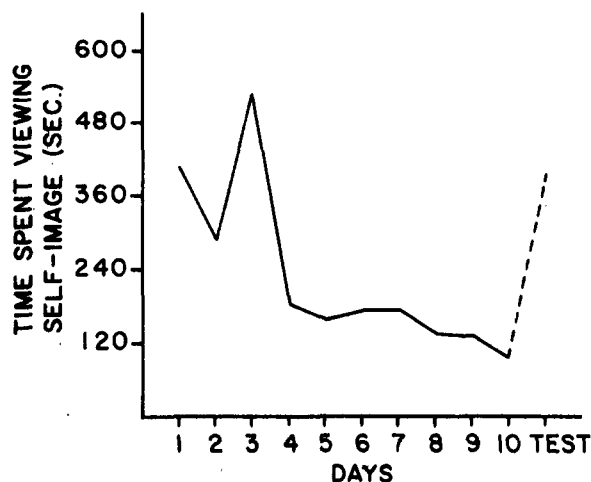


Figure 3. Average amount of time, during two 15-minute sessions, that chimpanzees spent viewing themselves in the mirror over days. (From "Chimpanzees: Self-Recognition" by G. G. Gallup, Jr., *Science*, 1970, 167, 86-87. Copyright 1969 by the American Association for the Advancement of Science. Reprinted by permission.)

viewing time (see Figure 3). The presence of red marks on the chimpanzees' faces greatly enhanced their visual attention to the reflection. In addition to mark-directed responses, there were also a number of noteworthy attempts to visually examine and smell the fingers that had been used to touch marked areas of the skin, even though the dye had long since dried and was indelible.

In an attempt to eliminate any doubt about the source of these reactions, several comparable chimpanzees that had never seen themselves in mirrors were also anesthetized and marked. When they were given access to the mirror for the first time, there were no mark-directed behaviors (see Figure 4), patterns of self-directed responses were completely absent, and the dye was ostensibly ignored. Throughout the test, their orientation to the mirror was as though they were seeing another chimpanzee, which implies that self-recognition was learned by the other animals sometime during the prior 10 days of mirror exposure.

To the extent that self-recognition implies a rudimentary concept of self, these data show that contrary to popular opinion and preconceived ideas, man may not have a monopoly on the self-concept. Man may not be evolution's only experiment in self-awareness. To date, these findings have been replicated a number of times by several investigators (e.g., Gallup, McClure, Hill, & Bundy, 1971; Hill, Bundy, Gallup, & McClure, 1970; Lethmate & Dücker, 1973) and extended by Lethmate and Dücker to include orangutans as well as chimpanzees.<sup>2</sup>

### *Self-Recognition in Other Primates*

In the initial study of self-recognition (Gallup, 1970), I also tested feral rhesus monkeys, java monkeys, and stump-tail macaques, but found no evidence for self-directed behavior even after as long as 21 consecutive days of mirror exposure. Moreover, after the application of red dye, the monkeys appeared insensitive to the source and significance of the marks reflected in the mirror. While reporting striking success with chimpanzees and orangutans, Lethmate and Dücker (1973) were also unable to demonstrate self-recognition in spider monkeys, capuchins, macaques, mandrill and hamadryas baboons, and two species of gibbons. K. Pribram (Note 1) and M. Bertrand (Note 2) have

<sup>2</sup> As yet there have been no systematic attempts to assess self-recognition in gorillas.

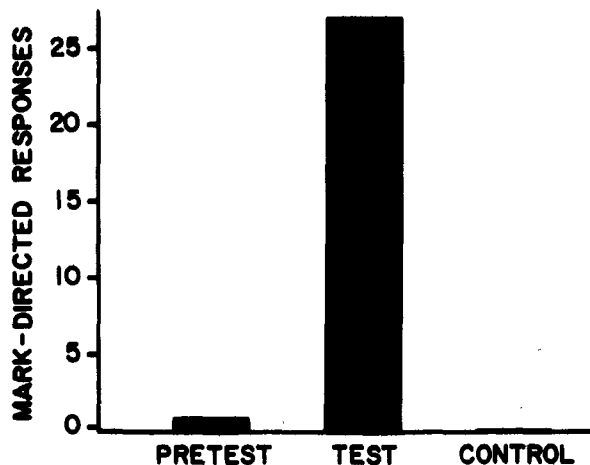


Figure 4. Number of mark-directed responses made by experimental animals before being exposed to the mirror, and by experimental and control animals during the test of self-recognition. (From "Chimpanzees: Self-Recognition" by G. G. Gallup, Jr., *Science*, 1970, 167, 86-87. Copyright 1969 by the American Association for the Advancement of Science. Reprinted by permission.)

likewise tested gibbons and macaques, respectively, but failed to find any indication that these animals were capable of realizing that their behavior was the source of the behavior depicted in the mirror.

In a more recent and exceptionally thorough study, Benhar, Carlton, and Samuel (1975) attempted to demonstrate self-recognition in olive baboons. In a series of four experiments they found that while a mirror had potent reinforcing properties, none of the baboons, after as long as 250 hours of mirror exposure, showed even the faintest signs of self-recognition. In desperation Benhar et al. (1975) even went so far as to try to teach a baboon to recognize its reflection with raisins as a reward, but to no avail. They concluded that "this ability to distinguish between 'self' and 'others' seems to be a quality specific to man and (great) apes."<sup>3</sup>

Since it is unusual to find substantial qualitative differences between monkeys and great apes in learning ability, or for that matter in most other basic psychological processes (e.g., Cowey & Weiskrantz, 1975; Mason, 1976), the apparent inability

<sup>3</sup> I used to feel the same way, but porpoises, because of their unusually large and complex brains, represent an intriguing alternative. The problem, however, would be to contrive an objective test for an animal with only flippers instead of arms and fingers.

of monkeys to discern the identity of the reflection is peculiar.<sup>4</sup> However, even though gibbons, which are classified as apes, and monkeys have been given seemingly ample opportunity to recognize their reflections, maybe with more time they might learn to decipher the significance of the "stranger" in the mirror. In the most recent attempt to salvage the conceptual integrity of monkeys (Gallup, in press), a wild-born, preadolescent, crab-eating macaque was given over 2,400 hours of mirror exposure for a period extending over 5 months, but it still failed to show any convincing evidence of self-recognition. By comparison, chimpanzees begin showing signs of self-recognition after only 2 or 3 days of mirror confrontation.

Why the striking discontinuity between great apes and other primate species? Why does a monkey seem incapable of learning that his behavior constitutes the source of the behavior depicted in a mirror?<sup>5</sup> On practically all other psychological tasks, including concept formation and problem-solving ability, the modal finding is a high degree of continuity among most primates. Although monkeys can learn to use mirrors to manipulate objects (Brown, McDowell, & Robinson, 1965), they appear incapable of learning to sufficiently integrate features of their own reflections to use mirrors to respond to themselves. Again, it is not that they are unable to learn to respond to mirrored cues. When looking at the reflection of a human or a bit of food, they can detect the inherent dualism as it pertains to objects other than themselves, and after adequate experience they do respond appropriately by turning away from the mirror to gain more direct access to the object of the reflection (Tinklepaugh, 1928). Still, for some strange reason they fail to correctly interpret their own reflections.

How are we to account for such an apparent psychological void between great apes and other primates?<sup>6</sup> I have suggested elsewhere (Gallup,

1975, in press) that the answer may relate to a cognitive deficit rather than a more mechanistic one. Monkeys appear to lack a cognitive category for processing mirrored information about themselves. The capacity for self-recognition, although influenced by learning, is predicated on a sense of identity.<sup>7</sup> The unique feature of mirror-image stimulation is that the identity of the observer and his reflection in a mirror are necessarily one and the same. The capacity to correctly infer the identity of the reflection must, therefore, presuppose an already existent identity on the part of the organism making this inference. Without an identity of your own it would be impossible to recognize yourself. And therein may lie the basic difference between monkeys and great apes. The monkey's inability to recognize himself may be due to the absence of a sufficiently well-integrated self-concept. While many organisms are ostensibly conscious of different features of themselves as a result of visual, tactile, chemical, and proprioceptive feedback, in principle this is quite different from self-consciousness. Without an identity, such input may not be fundamentally different from a simple awareness of other objects and/or events in the environment. With the exception of man and the great apes, eventually we may have to entertain the possibility that primate consciousness may be unidirectional.

We are a long way away from being able to specify a neurological basis for the sense of identity. However, self-recognition may represent an emergent phenomenon that only occurs once a species acquires a certain number of cortical neurons with sufficiently complex interconnections. Alternatively, one might view these data from the standpoint of a threshold model. Different organisms may very well have differing degrees of self-awareness, but only with an explicit sense of identity does self-recognition become possible. The threshold for self-recognition may be quite high compared to other forms of self-conception. It is possible that as yet undefined tests of the self-concept, which require a lower threshold for recognition, might yield positive evidence for monkeys.<sup>8</sup> For the meantime, however, the differences among primates

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<sup>4</sup> For some notable exceptions to the foregoing, see Rumbaugh (1971) and Rumbaugh and Gill (1973).

<sup>5</sup> Given several taxonomic categories (e.g., prosimians, New World monkeys, Old World monkeys, apes, and great apes), for the sake of simplicity I am using the word *monkey* to refer to all groups except the great apes.

<sup>6</sup> It is important to acknowledge that the apparent lack of continuity in this instance may be a consequence of a failure to tap an underlying continuum. The techniques described here were designed simply to assess the existence of self-recognition, not to quantify the capacity. Nevertheless, the absence of self-recognition in monkeys still requires explanation.

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<sup>7</sup> Identity can be defined as a sense of continuity over time and space. Memory represents one form of such continuity, but memory by itself neither presupposes nor necessarily provides for such a sense.

<sup>8</sup> Self-recognition also presupposes a high degree of intermodal equivalence, and until recently (Cowey & Weiskrantz, 1975; Weiskrantz & Cowey, 1975), cross-modal perception in monkeys was difficult to demonstrate (e.g., Ettlinger, 1967).

in self-recognition raise serious questions about recent claims (e.g., Griffin, 1976) concerning the evolutionary continuity of mental experience.

As far as chimpanzees and orangutans are concerned, I do not think their sense of identity or self-concept in any way emerges out of experience with a mirror. A mirror simply represents a means of mapping what the chimpanzee already knows, and it provides him with a new and more explicit dimension of knowing about himself, in the sense that he now has an opportunity to see himself as he is seen by other chimpanzees. In other words, chimpanzees may already have a self-concept, and a mirror may merely represent a means of objectifying its existence. This would imply that manipulations designed to retard or prevent the development of a self-concept ought to affect the capacity for self-recognition. Psychologists, however, know very little about the early development of self-concepts. Since it is introspectively obvious that most humans do have a sense of self-awareness, this has fostered an empirical and conceptual laziness about operationalizing the phenomenon. One has only to look at the literature on self-recognition in infants to realize how imprecise our methodology has been (Gallup, 1975).

### *Social Influences and Self-Conception*

An early approach to the ontogeny of self-conception involved what was called the "looking glass" theory of self (Cooley, 1912). Cooley proposed that the human concept of self was an interpersonal entity and as such was dependent upon social interaction with others. Similarly, according to George Herbert Mead (1934), in order for the self to emerge as an object of conscious inspection, the opportunity to examine one's self from another's point of view is required. Figuratively speaking, in order to conceive of yourself you may need to see yourself as you are seen by others.

In a preliminary attempt to evaluate the applicability of the Cooley-Mead model, I decided to examine the effects of social isolation on self-recognition in chimpanzees. Certainly a chimpanzee reared in isolation would never have had the benefit of another chimpanzee's experience or the opportunity to examine himself from another chimpanzee's point of view. To see if this would make a difference, both feral chimpanzees maintained in group cages and laboratory-born, isolation-reared chimpanzees were provided with 9 days of individual self-confrontation in a mirror (Gallup, Mc-

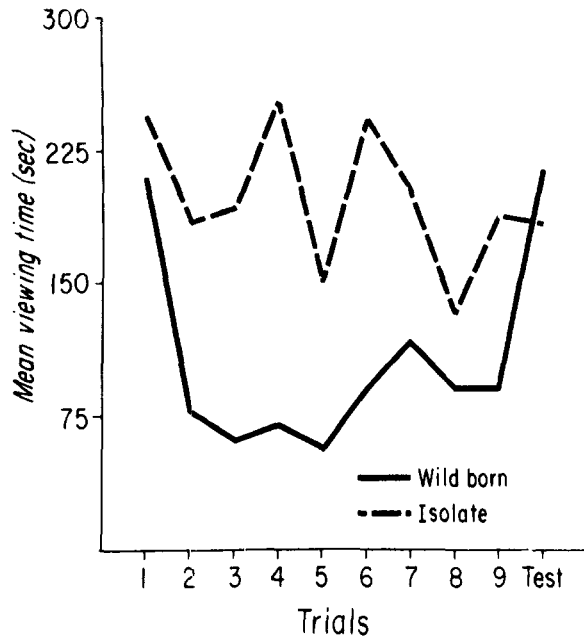


Figure 5. Average time during ten 30-minute sessions that wild-born and isolate chimpanzees spent viewing their reflections in the mirror. (From "Capacity for Self-recognition in Differentially Reared Chimpanzees" by G. G. Gallup, Jr., M. K. McClure, S. D. Hill, and R. A. Bundy, *The Psychological Record*, 1971, 21, 69-74. Copyright 1971 by The Psychological Record. Reprinted by permission.)

Clure, Hill, & Bundy, 1971). As shown in Figure 5, the wild-born animals exhibited a high degree of visual curiosity in the reflection, but as in the initial study, visual attention waned over days. The isolates, however, showed continuing and exaggerated attention to the mirror for the entire period. The increased viewing time demonstrated by the isolates is curiously reminiscent of the fact that socially deprived rhesus monkeys prefer to view mirrors rather than other rhesus monkeys (Gallup & McClure, 1971) and of the reports of prolonged mirror gazing by schizophrenic humans.

On the 10th day, all the animals were anesthetized and marked just as before. When tested for self-recognition, the feral chimpanzees evidenced 13.5 times more mark-directed responses than the isolates (see Figure 6). Moreover, the number of mark-directed responses shown by isolates on the test of self-recognition was equivalent to the number shown by ferals on the pretest. It is also interesting to note in Figure 5 that feral animals showed a dramatic increase in viewing time when they first saw themselves in the marked condition, and this

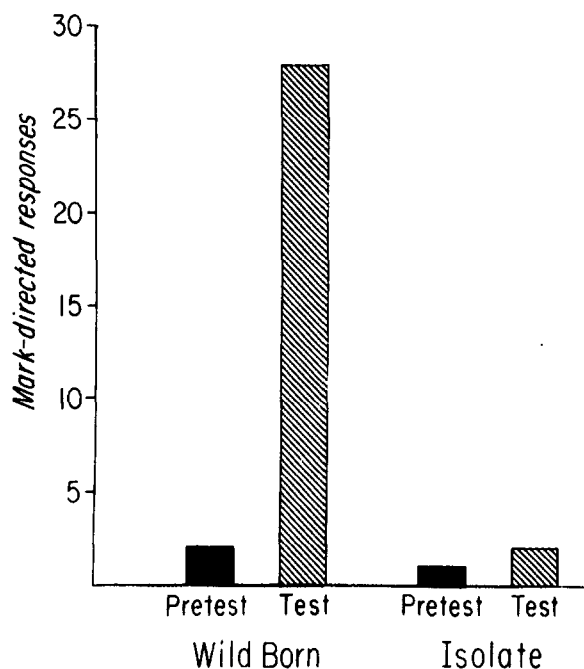


Figure 6. Number of times any marked portion of the skin was touched during a pretest without the mirror and on the test by wild-born and isolate chimpanzees. (From "Capacity for Self-recognition in Differentially Reared Chimpanzees" by G. G. Gallup, Jr., M. K. McClure, S. D. Hill, and R. A. Bundy, *The Psychological Record*, 1971, 21, 69-74. Copyright 1971 by The Psychological Record. Reprinted by permission.)

reinstatement of visual attention replicates the earlier findings (see Figure 3). But isolate-reared chimpanzees, as further evidence that they remain completely oblivious to the source of the reflection, showed virtually no change in viewing time on the test of self-recognition. Isolates, unlike normal chimpanzees, also failed to show any signs of self-directed behavior during the entire 10-day period.

As an extension of these findings, we (Hill, Bundy, Gallup, & McClure, 1970) obtained three additional isolation-reared chimpanzees, none of which showed any evidence of self-recognition. Prior to retesting each of the animals, two of the three were given 3 months of remedial social experience by housing them together in the same cage. In support of the Cooley-Mead model, after the opportunity to view themselves from the other's point of view, both animals showed preliminary signs of self-recognition, but the third chimpanzee, who remained in isolation, did not.

While I would like to interpret these data as being related to the development of a self-concept,

or lack thereof, it is important to acknowledge that there are several other and perhaps more parsimonious interpretations. Since isolates have never seen other chimpanzees, maybe they fail to speculate about the curious and atypical behavior of the "other" animal in the mirror who only responds when responded to. However, to the extent that viewing time can be used as a measure of the mirror's attractive potential, isolate chimpanzees have certainly not lost interest in the mirror. They show intense and unabated attention to the reflection for the entire 10-day period. On the other hand, it could be argued that early isolation somehow impairs or retards learning ability. Apparent learning deficits engendered by social isolation in primates, however, can be complicated by enhanced emotionality in novel situations (Harlow, Schlitz, & Harlow, 1968).

### *Self-Concept Distortion*

If explicit self-awareness is predicated on the opportunity to examine oneself from another's point of view, some intriguing possibilities are raised. Jung (1958) argued that a truly objective view of man would only be possible if we were able to see ourselves from another species' perspective. However, if the present analysis is correct and the opportunity to examine oneself was *restricted* to another species' point of view, this ought to profoundly distort one's concept of self. Although incomplete, the available data are not at odds with this proposition. According to Linden (1974), when Washoe, who was reared with humans, was first confronted with other chimpanzees, she referred to them in sign language as "black bugs." As a further illustration, it is well known that being reared in social isolation can have devastating effects on primate sexual behavior (e.g., Mason, 1960). Human-reared chimpanzees, however, are actually more impaired sexually than those reared in complete and abject social isolation (Rogers & Davenport, 1969). Why? Maybe it is because, just like Washoe, they think they are human.

Also related to the Cooley-Mead view of self-conception is an informal experiment conducted with another home-reared chimpanzee named Vicki. Among other things, Vicki was taught to sort stacks of snapshots into a human and an animal pile. One day, unbeknown to Vicki, her own photograph was placed in the stack, and when she came to her picture she placed it on the human pile (Hayes & Nissen, 1971). There are two ways to interpret



this. First, man may not be the only one to appreciate the similarities between chimpanzees and men. The other is that maybe Vicki thought she was human. The imprinting literature makes it clear that species identity, at least as defined by affiliation tendencies, is often tied to early social experiences. For you and I and the rest of the great apes, individual identity may also be subject to social influences.<sup>9</sup>

### Conclusion

Epstein (1973) has recently argued that the self-concept as traditionally conceived is intellectually bankrupt, since practically all definitions lack meaningful referents or tend to be circular. On the other hand, self-recognition represents a technique for providing empirical and operational substance to the existence of self-awareness. Moreover, contrary to the claims of some (e.g., Rose, 1976), these data demonstrate that the distinction between consciousness and self-consciousness may not be a pseudoproblem.

For better or for worse, there is as yet no way that I can experience your experience, or for that matter, the experience of any organism other than myself. However, some of the most intriguing problems in psychology involve the discovery of ways to infer and map experience in other organisms. As far as the self-concept is concerned, it would appear that on the morning before God created the great apes, maybe he became distracted by his own reflection in the mirror and forgot to shave with Occam's razor.

<sup>9</sup> It is intriguing to note that while the content may, the existence of self-awareness in chimpanzees does not appear to be predicated on a particular species identity. Many home-reared chimpanzees show signs of self-recognition in response to mirrors but an active avoidance of, or even disdain for, members of their own species (e.g., Temerlin, 1975).

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