THE INFLUENCE OF REARING CONDITION ON CHIMPANZEE INTRODUCTIONS

Linda Brent

INTRODUCTION

The process of group formation in captive chimpanzees (Pan troglodytes) can be characterized as tense, both for the chimpanzees and the humans involved. Given the chimpanzee’s normal social structure, as well as its size and strength, it is not surprising that artificially introducing individuals to a group in captivity can be difficult with a potential for aggression and wounding. Wild chimpanzees live in a particular territory in large, complex groups made up of many smaller groups with fluid membership. Chimpanzees are usually aggressive to individuals from neighboring communities, although females in estrus may be able to transfer permanently or temporarily to a new group (Goodall, 1986; Nishida, 1979).

A wild infant chimpanzee must learn a great deal about both the social and physical environment to be able to successfully navigate through life as an adult. Wild infant chimpanzees are usually dependent on their mothers for 4-5 years (van Lawick-Goodall, 1967), during which time they can learn from their mother and exposure to the other group members. In captivity, a large number of adult captive-born chimpanzees experienced little to no maternal care as infants because they were removed from their mothers due to incompetent maternal skills, illness or injury, or to increase reproductive output. Even those remaining with the mother rarely experienced the complexity in the social and physical environment similar to a wild chimpanzee infant.

Severely restricted early environments have been related to gross deficits in cognitive, social, maternal and sexual behavior and the development of abnormal behavior (i.e., Davenport, 1979; Menzel et al., 1970). Differences in behavior have also been reported between captive chimpanzees with different rearing conditions. For example, in a tool-using task, wild-born chimpanzees performed significantly better than captive-born (both nursery- and mother-reared) (Brent et al., 1995). It is hypothesized that rearing condition may be related to individual differences in social behavior, especially during the critical process of group formation. It is the purpose of this study to analyze rearing condition as a factor in the display of social behavior during the initial introduction period.

METHODS

Subjects for the study were 154 chimpanzees with known rearing history, categorized as removed from the mother and raised in a nursery by humans (n=51), raised by their mother in captivity for 1-11 months (n=49), raised by their mother in captivity for greater than 11 months (n=34) or born in the wild (n=20). All subjects were housed at the Southwest Foundation for Biomedical Research in indoor/outdoor runs of various sizes.

Information from group formations was collected for each subject. The frequency of all social behaviors was recorded for each individual during the first 10 minutes of the introduction, which was accomplished by placing the new individual directly in with another individual or group. The outcome of the introduction was determined as successful if the subject remained in the group for more than 1 month. Some individuals were removed from the group due to injury or inaccessibility to food or water due to dominance relations, and these introductions were deemed unsuccessful.

Data were summarized as the total frequency of behaviors in each category (aggressive, submissive and affiliative) exhibited by the subject during the 10 minute period and are presented as such in the results. If data from more than one introduction event were available for a particular subject, the mean values were used in analyses. The level of aggressive, submissive and affiliative behaviors was related to rearing condition. Because previous analyses have indicated that sex was a main predictor of success in an introduction, this was used as a factor as well in a multivariate analysis of variance procedure. Significance was defined as p < 0.05.

RESULTS

The overall success rate of introductions was 84.3%. There was a significant interaction between rearing condition and sex of the subject on outcome, such that wild born males had fewer successful introductions (see Figure 1).

The behaviors exhibited during the introduction period also varied by sex and/or rearing condition. Submissive behavior was significantly lower for females than males [F(1,146) = 10.65, p < 0.001] (males: x̄ = 2.91, SE = 0.52, females: x̄ = 1.31, SE = 0.18). Aggression had a significant interaction between rearing condition and sex [F(3,146) = 3.41, p < 0.019] in which the level of aggression of nursery-reared males (x̄ = 4.69, SE = 0.65) was much higher than for any other rearing/sex class (range 1.36 – 2.74). There was also a nonsignificant trend toward lower levels of affiliation for wild-born individuals [F(3,145) = 2.57, p < 0.073].

DISCUSSION

Although the formation of complex groups of chimpanzees in captivity can be difficult and potentially dangerous, most studies report the great majority of introductions to be successful (Alford et al., 1995; Brent et al., 1997; Fritz and Fritz, 1979; McDonald, 1994). Bloomsmith and colleagues (1999) found that social behaviors changed significantly as chimpanzees proceeded through the process of gradually gaining full contact to new group members, and all group enlargements were successful. Even when there is little or no opportunity for prior familiarization of individuals across a barrier, chimpanzees usually develop stable relationships after introduction (Brent et al., 1997).

Recent studies have begun to shed light on factors that influence the process and outcome of chimpanzee introductions. Several studies have indicated that sex of the chimpanzee significantly influences behavior during introduction (Alford et al., 1995; Brent et al., 1997; Fritz and Fritz, 1979; McDonald, 1994). Bloomsmith and colleagues (1999) found that social behaviors changed significantly as chimpanzees proceeded through the process of gradually gaining full contact to new group members, and all group enlargements were successful. Even when there is little or no opportunity for prior familiarization of individuals across a barrier, chimpanzees usually develop stable relationships after introduction (Brent et al., 1997).

1Department of Laboratory Animal Medicine, Southwest Foundation for Biomedical Research, San Antonio, Texas
et al., 1997, but see Bloomsmith et al., 1999), and that male introductions are often less successful and include more wounding.

This study indicates that rearing condition is also influential on the behavior and outcome of chimpanzee introductions. Because nursery-reared chimpanzees are thought to lack the early environment that stimulates appropriate social skills, we expected nursery-reared chimpanzees to behave differently during the introduction process and perhaps be less able to integrate with others. Nursery-reared males were more aggressive than females and other males. It is possible that males may be more affected by early rearing environment than females. Restrictive rearing conditions have a more detrimental effect on male sexual behavior (Davenport, 1979) and rocking is a more common abnormal behavior in male chimpanzees (Nash et al., 1999). Subjectively, we have noticed that certain nursery-reared males do not interpret the submissive gestures of other chimpanzees accurately, and continue to display aggressive behavior. Analyses of aggressive interchanges involving nursery-reared males will help to determine if this observation is accurate.

We also found that a successful introduction was less likely for wild-born males. These individuals may have been more socially sophisticated than other chimpanzees, and less tolerant during group formation. Alford and colleagues (1995) did find that introducing socially competent individuals to socially incompetent individuals resulted in more wounding. It is likely that in the current study, most introductions involved wild born and captive born chimpanzees, which may be likened to the socially competent and incompetent individuals. However, this hypothesis deserves further study.

**Acknowledgements:** The author wishes to thank H. Barrera and the animal care staff for their assistance with the chimpanzee introductions, and M. Ashley for her help with data summarization.

**References**


