Social Interactions of Monkeys Reared in a Nuclear Family Environment Versus Monkeys Reared with Mothers and Peers*

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ABSTRACT. Four-year-old laboratory-born rhesus monkeys that had been reared in a nuclear family social environment consisting of mothers, fathers, siblings, peers, and other adults of both sexes were permitted to interact in various combinations with equal-aged monkeys that had been reared in an environment consisting of only mothers and peers. It was found that in most interaction sessions nuclear family subjects exhibited significantly higher levels of dominance and activity behaviors and significantly lower levels of submissive and passive behaviors than the mother-peer-reared subjects. These differences were not evident when subjects were tested within their own rearing groups. The significance of the results with respect to previous and future studies of social development in differential social environments is discussed.

INTRODUCTION

Without question, one of the most important and consistent findings in the area of primate behavioral research over the past decade has been the relationship between early social experience and subsequent social development. Infant monkeys have been reared in total social isolation, where they can neither see nor contact other monkeys (HARLOW, DODSWORTH, & HARLOW, 1965), in partial social isolation, where they can see but not contact other monkeys (SUOMI, HARLOW, & KIMBALL, 1971), with surrogate mothers only (HARLOW & SUOMI, 1970), with real monkey mothers only (ALEXANDER, 1966), with surrogate mothers and peers (ROSENBLUM, 1961), with real mothers and peers (HANSEN, 1966), and with mothers, other adult females, one adult male, and peers (HINDE & SPENCER-BOOTH, 1971). It has consistently been demonstrated that the more socially complex an infant monkey's rearing environment, the more socially competent and sophisticated behaviors the monkey will develop. For example, a monkey reared in total social isolation for the first 6 months of life or in partial isolation for the first year of life is highly unlikely to develop species-appropriate aggressive (MITCHELL, RAYMOND, RUPPENTHAL, & HARLOW, 1966), sexual (SENKO, 1966), or maternal (ARLING & HARLOW, 1967) behavior. A monkey reared with only its mother is likely to develop species-appropriate sexual and (for females) maternal behavior but not aggressive behavior (ALEXANDER, 1966; SUOMI & HARLOW, 1971).

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Mother-peer-reared monkeys are likely to develop most species-appropriate social behaviors (Harlow & Harlow, 1969). The differences in social capabilities are most evident when equal-aged monkeys reared in different environments are permitted to interact with each other. In such situations, partial isolates are usually "dominant" over total isolates (Rowland, 1964), peer-reared subjects are usually dominant over partial isolates (Pratt, 1969), and mother-peer-reared subjects are usually dominant over peer-reared subjects1). Such findings have reinforced the position that social complexity of rearing environment and subsequent social sophistication are positively related and have formed the basis for theoretical explanations of social development in monkeys, e.g., Harlow and Harlow (1965) and Sackett (1972).

Recent work at the Wisconsin Primate Laboratory has focused upon the social development of monkeys reared in yet another laboratory environment. Created by M. K. Harlow (1971) and termed the nuclear family environment, it provides infants with the opportunity to interact with their biological mothers, fathers, siblings, peers of disparate ages, and adults of both sexes. As such, the nuclear family environment is considerably more complex socially than previous laboratory environments.

Observation of social development of rhesus monkey infants in the nuclear family environment has been carried out over the past 4 years. Preliminary findings have suggested that social development of monkeys reared in this environment is more complete and accelerated chronologically than that of monkeys reared in other social environments currently existing at the Wisconsin Laboratory (Suomi, 1972). However, in order to substantiate more completely these allegations, direct comparison of nuclear family monkeys with mother-peer-reared monkeys was performed by permitting mutual social interaction among subjects from both rearing environments.

**METHOD**

**SUBJECTS**

Subjects were six rhesus monkeys (*Macaca mulatta*), four males and two females who averaged 50 months of age at time of testing. Two of the males and one female were reared from birth in the same nuclear family apparatus, designed and described by M. K. Harlow (1971) and illustrated in Figure 1. Each nuclear family subject (NF) had continual access from birth to its mother, father, and younger siblings as they were born and unrestricted access to other adults of both sexes and their offspring 6 hours per day. The remaining two males and one female (MP) were all housed from birth with their mothers in a 6 × 6 × 8 ft gang cage. When their mean age was 8 months their mothers were removed from the cage and the subjects remained in the cage as an intact group. Both NF and MP subjects lived in their respective rearing environments until time of testing with the following exceptions. Nuclear family monkeys each were subjected to approximately 30 min of learning testing per week and participated in a study of social preferences which did not involve physical contact with other monkeys (see Suomi, Eisele, Grady, & Tripp, 1973 for further details). Each MP subject had previously participated in a similar social preference study and had also been sepa-

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