

RESEARCH REPORT**Cyclic Development of Contact Behavior
in Apes and Humans**

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ABSTRACT. Nursing and mother-infant distance were observed in three orangutans, two gorillas, one chimpanzee and four humans. All four species showed periods of a recurrence of greater time spent nursing and in contact with the mother. The initial regressive or reattachment period occurred similarly in all four species at between 6-12 months of age. An orangutan observed for two years showed a second period at 19-21 months. Other studies of weight gain in the three ape species coincidentally peaked at the same time. When estimated peaks of individuals of each species were summed, the resulting graphs showed a differentiation of species rates of development. Gorillas developed most rapidly, orangutans developed most slowly, while chimpanzees and humans developed within the middle range.

Key Words: Development; Gorillas; Orangutans; Chimpanzees; Apes.

INTRODUCTION

Behavioral development in diversely different mammals and birds follows an oscillating pattern rather than proceeding in a unidirectional manner (HORWICH, 1974, 1987). BOWER (1976) notes reoccurrences of behavioral patterns in human infants as well. Mother-infant contact in particular shows periods of higher rates in specific later age classes following the initial few months of age. These periods which I feel are at the roots of mammalian and avian sociality have been termed regressive periods due to the infantile quality of the period which may include more nursing, crying, and other behaviors designed to elicit additional care. Despite the infantile behaviors, development in reality proceeds in a spiral fashion (AMES & ILG, 1964) in which new patterns may be added to the old or in which the old patterns may be used in new ways. These periods may be better termed reattachment periods or reorganizational periods (EMDE et al., 1976; SROUFE, 1979) in which the infant is undergoing internal reorganization before progressing forward.

This study determines the presence of such periods in individual humans, chimpanzees, orangutans, and gorillas, indicating physical oscillations as well. The first regression which occurs at 6-12 months seems related to the period in humans in which the infant shows fear of strangers. However, as seen in humans and apes, fear of strangers may be just one characteristic of a generalized insecure age period in the infant.

METHODS

Three orangutans, two gorillas, one chimpanzee, and four human infants were observed

Table 1. Information on subjects observed.

Individuals	Birth date	Reproductive state	Months observed	Location	Social situation	Hours observed	Cage size (ft)
Gorillas:							
<i>Weaver</i> (male)	May 17, 1971	Primiparous	1-12	BZ	No others	47	20 × 20
<i>Mumbi</i> (female)	April 21, 1971	Primiparous	1-14	LPZ	Adult male later	32	20 × 20
Chimpanzee:							
<i>Henry</i> (male)	March 3, 1971	Multiparous	1-11	LPZ	Adult male	20	20 × 20
Humans:							
<i>Willow</i> (female)	January 1, 1978	Multiparous	1-17	Home	2 year sister	79	—
<i>Autumn</i> (female)	September 30, 1977	Primiparous	1-19	Home	Father occass.	58	—
<i>Genya</i> (female)	May 6, 1978	Multiparous	1-13	Home	Father occass.	41	—
<i>Malyyka</i> (male)	June 29, 1977	Primiparous	9-24	Home	Brother b. 19 mos.	74	—
Orangutans:							
<i>Amie</i> (female)	April 23, 1970	Primiparous	1-24	BZ	Adult male occass.	84	20 × 20
<i>Ronald</i> (male)	June 18, 1974	Multiparous	1-14	BZ	Sister, adult male occass.	82	20 × 20
<i>LPZ</i> (female)	March 30, 1971	Primiparous	1-12	LPZ	Adult male	30	8 × 12

in a variety of situations. Two orangutans and one gorilla were observed at Brookfield Zoo (BZ) and one orangutan, one gorilla, and the chimpanzee were observed at Lincoln Park Zoo (LPZ). All of these infants were in cages on public display where observations were made. The four human infants were observed in their own houses under naturalistic conditions. All four human mothers were Caucasian from a middle class urban background. All were part of an alternative rural subculture and were between 24–30 years of age during the study. Observations on the mother and infant pair were made in each family's main living space. Mothers were asked to act as usual while under observation and not to interact with the observer. My personal interactions toward either the mother or infants were kept neutral and to a minimum until after the observations were over. I often visited with the mothers following the observation period. If the infants attempted to make contact, only neutral responses without eye contact were made.

Table 1 gives the general details of all infants studied. Each infant was observed for 1–2 hr periods at approximately the same hour each day. The apes were observed in the afternoon between 1:00–4:00 p.m. while the humans were observed between 9:00–12:00 a.m. A variety of behaviors were recorded for each infant but only the profiles of nursing and contact will be considered in this paper. Nursing was recorded as the time each individual was observed awake on the breast to the nearest half minute. The location of the mother and infant was additionally noted at the beginning of each minute. Contact was recorded when the mother and infant were touching in any way at the beginning of each minute.

RESULTS

Figure 1 shows clear and dramatic fluctuations in orangutan nursing. All three infants show an initial peak at two months which is the highest level of nursing during their development. All three show a decrease after that with the Lincoln Park Zoo infant showing an extended relatively high level of nursing until 8 months of age. The low levels are reached at 6, 8, and 10 months, respectively in *Ronald*, *Annie*, and the LPZ infant. Both *Ronald* and *Annie* show a dramatic increase at about a year. *Ronald's* regressive period extends from 10–13 months while *Annie* peaks at 12 months. The LPZ infant shows an increase until 12 months when observations on her were terminated. Her peak may have continued later. *Annie*, who was observed until 2 years of age shows a second increase between 19–21 months of age.

Contact between *Annie* and her mother support the nursing data, indicating a prolonged contact period from birth to 5 months, a decrease and a slight increase between 9–13 months of age indicating a more prolonged regressive period despite the short nursing peak. This agrees with the longer contact period of *Ronald's*. *Annie's* contact level additionally rises again at 22 months of age (Fig. 3).

The two gorillas, despite different mothers and different living situations show a synchronous regressive period in nursing at 6–9 months of age after exhibiting an initial high during the first month (Fig. 2). Contact data of *Weaver* agrees, indicating a second peak at 8 months (Fig. 3).

The lone chimpanzee observed showed an initial high period from 1–3 months in nursing, a decrease and a regressive period at 9–10 months of age (Fig. 4). Figure 3 shows that mother-infant contact again coincides with the nursing confirming a regressive period at 9–10 months of age.

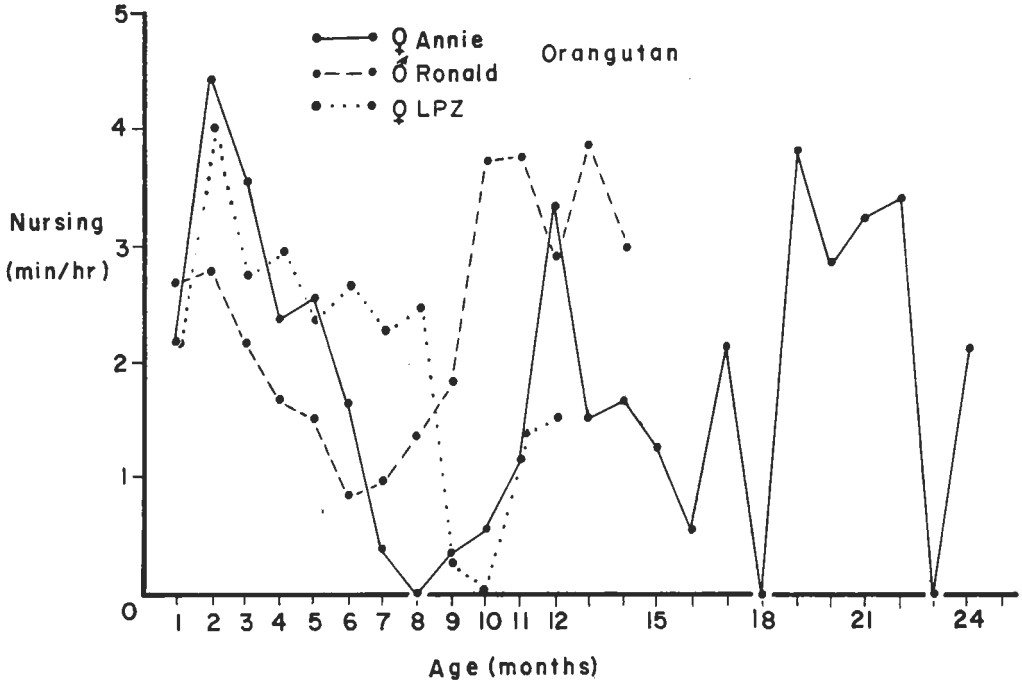


Fig. 1. Time spent nursing in three orangutan infants as a function of age in months.

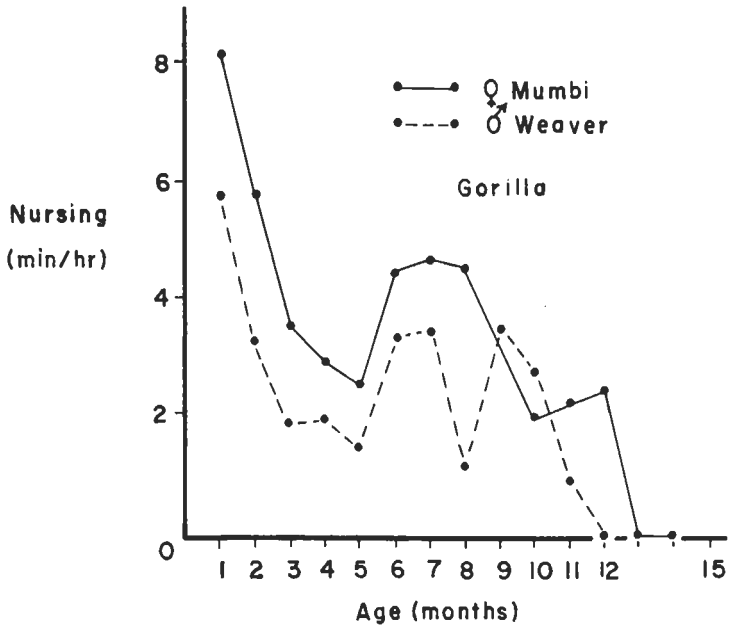


Fig. 2. Time spent nursing in two gorilla infants as a function of age in months.

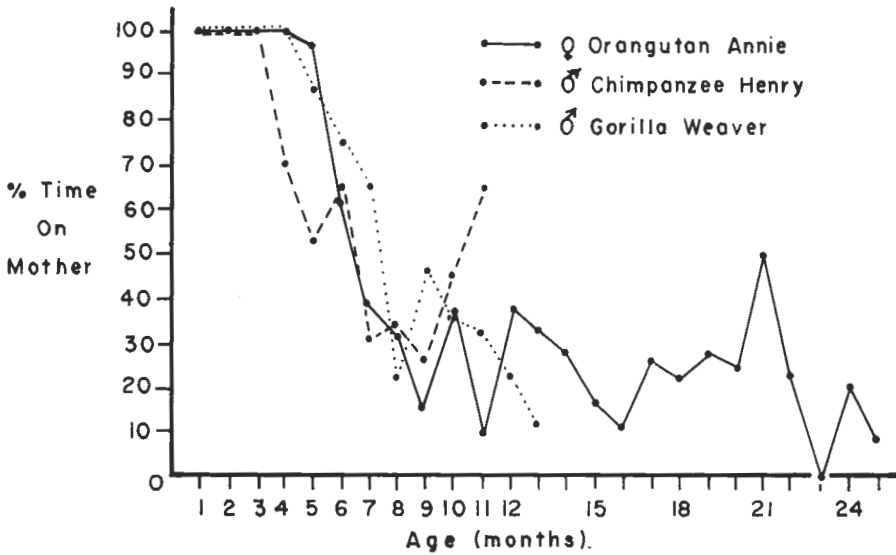


Fig. 3. The percent of time spent in contact with the mother in three ape infants as a function of time in months.

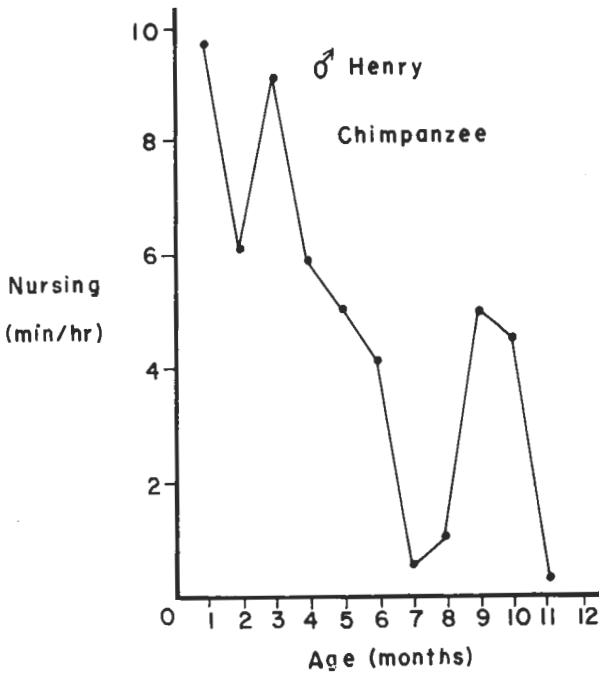


Fig. 4. Time spent nursing in a male chimpanzee infant as a function of age in month.

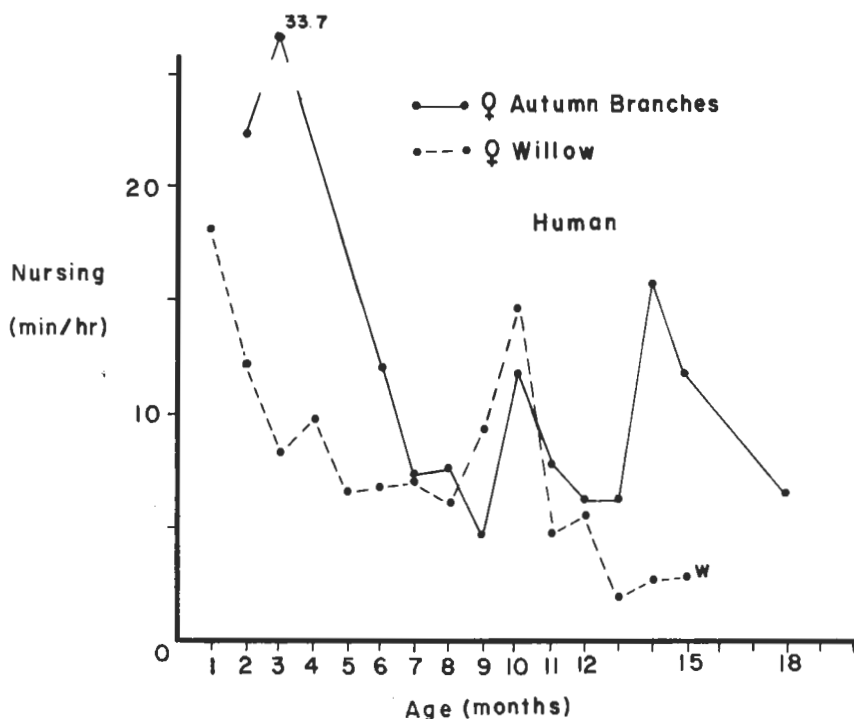


Fig. 5. Time spent nursing in two female human infants as a function of age in month.

Figure 5 shows nursing in two female human infants. After the initial early high, both decrease and regress at 9 months. *Willow* was weaned during the 15th month while *Autumn Branches* showed a second peak at 14–15 months. Figure 6 shows the contact fluctuations concurring with initial peaks in both babies from 8–10 months and *Autumn Branches* showing the second peak at 14–15 months.

Genya and *Malykka* (Fig. 7) data are not as clear as the others. A single month rise at 4 months is not supported as a full regressive peak not showing continuity on either side of it; I feel the main regressive period occurs at 7–8 months although it is slight. This peak is supported by the contact data profile (Fig. 8) which exhibits the normal decrease and regression at 7–8 months. *Malykka* was observed initially at 8 months, so his peak is hard to interpret. He shows a peak in nursing at 12 months when he was then weaned. This peak concurs with the contact data. However, I am not sure if this was the first or second regressive period as it comes in between the two periods of the other infants.

DISCUSSION

A wide variety of mammals and birds show a cyclic profile in behavioral development (HORWICH, 1974, 1987; HORWICH et al., 1983). Specifically, contact behaviors increase and decrease at species specific ages during infant development. These social periods may have a variety of functions for different species (HORWICH, 1987; HORWICH et al., 1982; HORWICH & WURMAN, 1978). This paper exhibits the occurrence of such regressive or reattachment

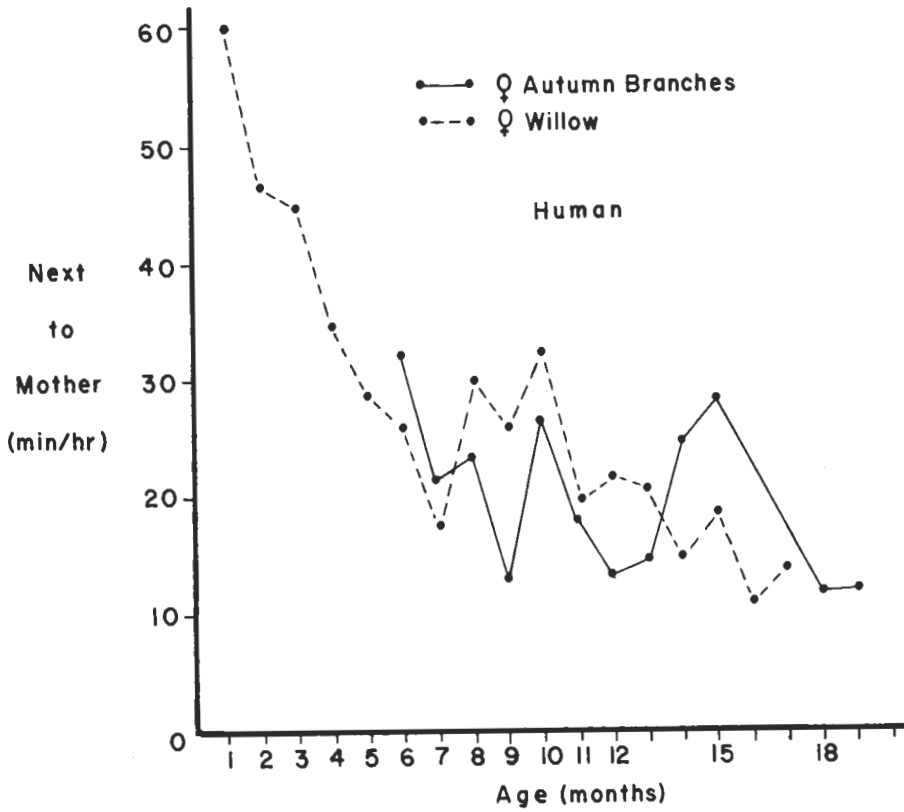


Fig. 6. Time spent in contact with the mother of two female human infants as a function of age in months.

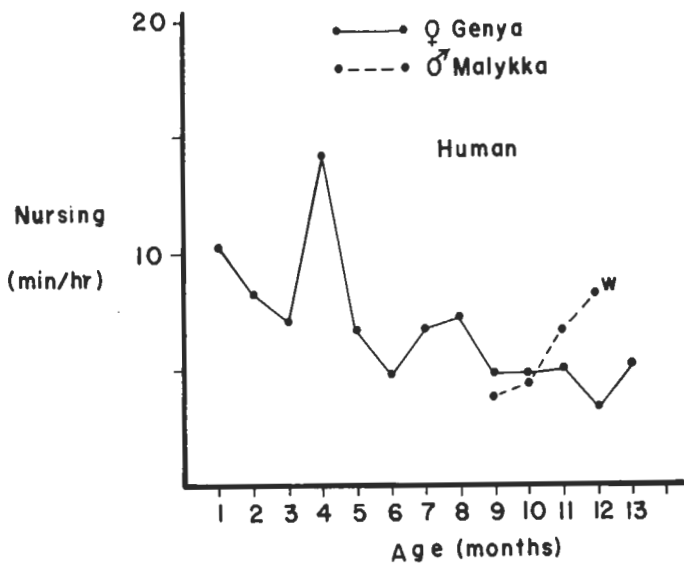


Fig. 7. Time spent nursing in two human infants as a function of age in months.

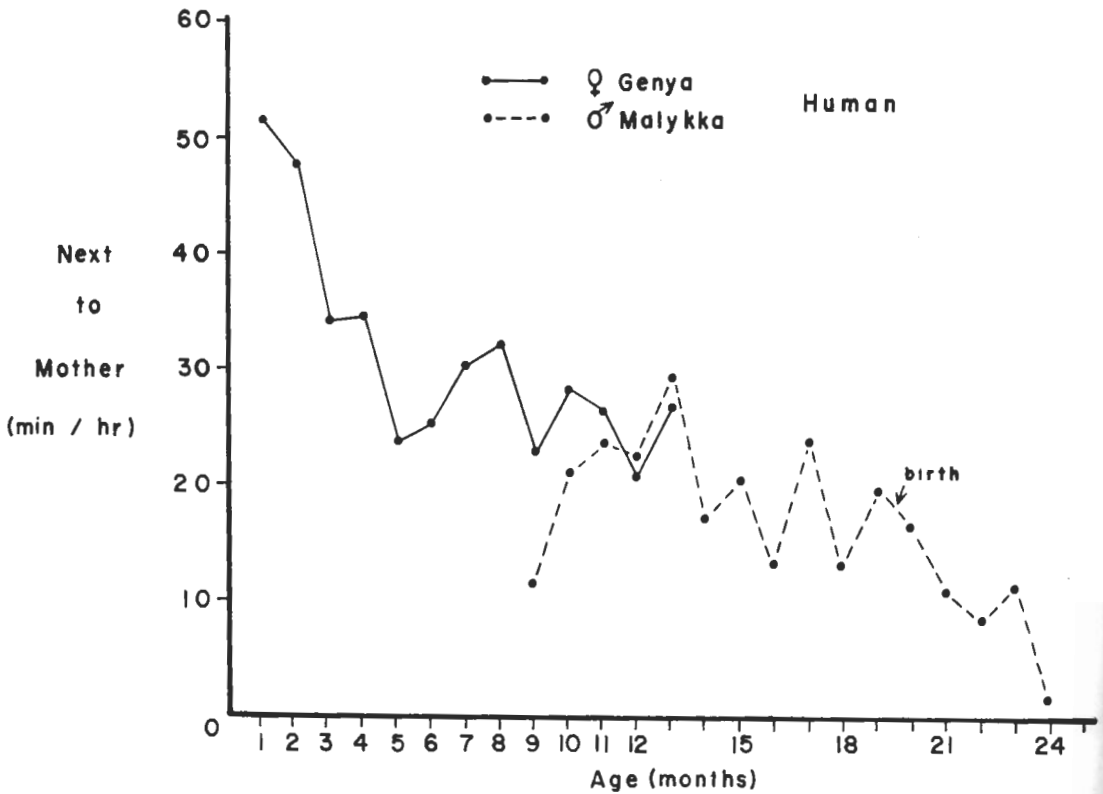


Fig. 8. Time spent in contact with the mother of two human infants as a function of age in months.

periods in apes and humans and shows an approximate similarity of age scale in apes and humans. These periods may potentially provide species-specific aging tabs for comparing similar age periods and growth rates in different species.

Although the number of infants of each species is small, the data clearly indicates a similar period of reattachment between the mother and infant in the four species. Similar data in three other studies indicate a recurring peak in suckling. Field data on the infant chimpanzee, *Flint* (VAN LAWICK-GOODALL, 1967) indicate a clear regression in suckling at 10–12 months of age. Other data on chimpanzees of (HORVAT et al., 1981) do not show very clear increases although two individuals (*Betty* and *Palita*) show an increase within the range noted for other infants.

Lumped data of four gorilla infants (HOFF et al., 1981) indicate a regression at 5–9 months in agreement with my data. I additionally found interesting patterns of monthly weight gains in apes by replotting data by GIJSENS and TIJSENS (1971). Two infant gorillas were systematically weighed, almost daily. Using this data, I graphed the monthly weight gains. *Victoria* was observed from birth by the authors while *Gust*, a male, was thought to be about 8 months when acquired. Since his age was not definitely known, and since he showed similar weight fluctuations to *Victoria*, I shifted his age by three months on the graph. Both gorillas show two peaks, at 5–9 months and again between 13–17 months. An orangutan infant observed in the same study showed a weight gain as well between 6–10 months of age but failed to show a second peak. Additional lumped data on male and female chimpanzees

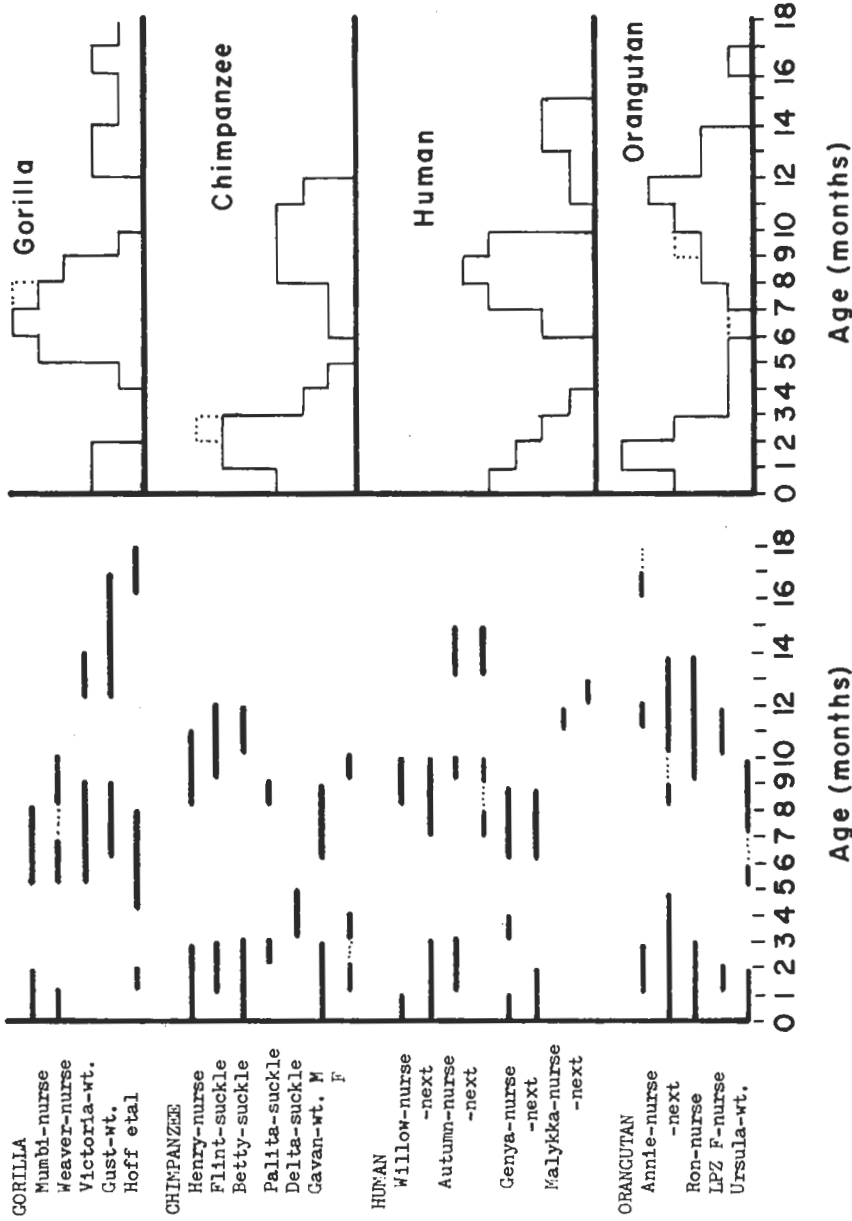


Fig. 9. Individual peaks in nursing, mother-infant contact, and weight gain represented graphically as a function of age in months (left). All individual peaks on left summated per species and plotted as a function of age in months (right).

determined from GAVAN (1971) indicates similarly that chimpanzees also have a weight gain peak at 8 months in males and 10 months in females.

All of these instances indicate an initial regressive period at about 6–12 months and some of the infants of all the species showed a second peak between 13–21 months of age though not all the individuals showed it. In humans 6–10 months has been referred to as a period of rapid development (WATERS et al., 1975) and EMDE (pers. comm.) has termed the period of 7–9 months a period of behavioral shift. My initial impression when comparing my data was that orangutans seemed to show a more drawn out growth with later regressive peaks. Additionally, they nurse less time than any of the other species, nursing at maximum only 4–5 min per hour. Chimpanzees and gorillas were comparable with our chimpanzee nursing maximally close to 10 min per hour and gorillas 6–8 min per hour maximum. The human infants showed by far the longest nursing periods, initially, between 10–34 min per hour of observation. *Autumn Branches'* mother was a new mother and was particularly careful, initially allowing a great deal more nipple contact than the other mothers. She often allowed *Autumn* to nurse and fall asleep on the breast even though she was not taking milk. Still, all the human mothers showed a much higher level of nursing than any of the apes.

In attempting to make a gross comparison of the regressive periods across species lines, I took all comparable data discussed earlier and estimated graphically the months when the regressive peaks occurred. They are graphically represented as discontinuous lines for each infant as a datum (Fig. 9, left). When each of these peak lines are totaled on a monthly basis for all of the same species (Fig. 9, right) there is a gross indication of species specific age of regressive peaks. Thus, in summary, we see that gorillas show the earliest peak at 6–7 months. Humans and chimpanzees overlap, humans peaking at 8–9 months, and chimpanzees at 8–11 months, while orangutans show the latest reattachment peak at 11–12 months of age.

It is generally noted that humans have the longest period of development of any mammal (NOWAK & PARADISO, 1983). This implies that humans have a very slow development rate and assumes that all age periods are equal in developmental rate. By measuring the same behaviors in different species this research indicates a method for comparing age periods in related species. It shows an initial reorganization time during the first year with two main points emerging: (1) This developmental data agrees with genetic evidence that humans are more closely related to chimpanzees than other apes (SETH & SETH, 1986); and (2) developmental rates probably vary with the age period; the developmental rate of this first age period, and perhaps others as well, may vary with species social and ecological adaptations. What was most obvious was how slow orangutan infants develop during the first year and how tied they are to maintaining grasping contact with their environment. While gorilla and chimpanzee infants walk and humans crawl away on their own on the ground, orangutan babies are reticent to do so and have a great need to grasp something when moving along the floor. This need continues in some infants after a year. During earlier times at 5–6 months they are often quite content to hang from over head bars where their mother has placed them. This suggests that adaptations for an arboreal life may have slowed down their early development for the infant's protection.

CONCLUSIONS

Apes and humans show similar periods of regression or reattachment to the mother as shown by increased nursing and contact. These behaviors coincide with an increase in weight

gain at the same age. The initial regressive period occurs at a similar time in all four species at between 6–12 months of age. Estimated peaks tabulated for existing data of individuals from each species indicates a progression of developmental rates with gorillas developing most rapidly, orangutans most slowly, and chimpanzees and humans developing at approximately the same rates during early development.

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