Internal Working Models, Trust, and Sharing among Foragers[1]

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Examining forager economic and social behavior, Bird-David has hypothesized (1990:194) that "gatherer-hunters share the characteristic that their members' views of the environment are centered around metaphors that commonly draw on primary kin relations, though not necessarily just on the 'parent' relation. These metaphors entail a common view of the environment as giving, though in varied ways." She has suggested that many aspects of forager economic behavior—demand sharing (Barnard and Woodburn 1988), lack of food storage, and minimal time spent in subsistence activity—are linked to culture-specific metaphors (cognitive models) that contribute to a trusting, giving, and generous view of the environment. Among some forager groups (Nayaka, Mbuti, and Batek in her study) the parent-child relationship is the primary metaphor ("forest as parent")—people view the environment as an ever-providing, loving, and unconditionally supportive parent—whereas in other forager groups the metaphors are linked to sexual relatedness (Canadian Cree) or procreational relatedness (Australian Aborigines) (Bird-David 1993). Although there is diversity in the metaphors cultures utilize to integrate views of the natural and social environments, Bird-David indicates that there are metametaphors common to most if not all foragers that convey "giving" or trusting views of the environment, and this view of foragers is widely accepted by those who study foragers. Thus, for example, Richard Lee (1998) listed "the giving environment" as one of the distinguishing features of foragers in his keynote address at the recent International Conference on Hunting and Gathering Societies in Osaka.

Bird-David's analysis is important because it identifies and gives priority to cultural models of how foragers themselves view their environment and because it offers a viable supplement to ecological explanations of forager subsistence. We agree with many of her observations and characterizations of foragers and believe that an understanding of foragers' schemas may provide insights into their economic and social relations. Unfortunately, her approach (like that of Ingold [1990] and Woodburn [1982]) does not identify the mechanisms by which local (i.e., culture-specific) or pan-forager metaphors, schemes, or cognitive models develop. What is the process of intergenerational cultural transmission? How do foragers in diverse physical and social contexts acquire pan-forager schemas? This paper identifies a mechanism that partially explains how and why foragers might become trustful of others and of the natural environment—the internal working model.

The internal working model is a dynamic, affectively charged model based upon an infant's experiences with caregivers (Verschueren, Marcoen, and Schoefs 1996). Bowlby developed the concept as part of his theory of infant-caregiver attachment (1969, 1973). He was interested in explaining the intense distress, anxiety, and despair infants exhibited when separated from their primary caregivers. He hypothesized that the infants' fussing, crying, crawling, or reaching functioned to maintain proximity to caregivers and that this strategy was designed by natural selection to promote the safety and survival of infants. Research in several cultures supports the universality of the attachment system, as infants in all cultures demonstrate attachment behaviors towards specific others by late infancy (Main 1990). Babysitters and parents usually learn that very young infants can be transferred to several individuals without the infant's fussing or crying much, but by eight months the infant will cry for particular others and often does not want to be held by strangers (e.g., a new babysitter).

As their memories and information-processing capacities mature and there are repeated infant-caregiver interactions, infants develop schemas—cognitive knowledge structures or internal working models. Infants with primary caregivers who are warm, attentive, take their perspective, perceive their signals and interpret them correctly, and react promptly and contingently develop "secure" and trusting internal working models of others and self (Lamb 1981, Lamb et al. 1984). Infants whose primary caregivers misread and either do not or inconsistently respond to their cues develop "insecure" and mistrustful internal working models of others and self. Infants with a secure sense of self and others are more likely to explore their environments and become more autonomous. Insecure infants develop feelings of anxiety, fear, or grief and tend to have low expectations about self-with-others (Main 1990); their fear and distrust can lead to assertiveness, aggression, and violence.

Internal working models emerge in infancy, but several recent longitudinal studies and meta-analyses indicate that they are relatively stable from the early years through adolescence and adulthood (e.g., Fraley 1998, Waters et al. 1995). They help individuals predict and

 We are grateful to the Aka, Ngandu, and Euro-American families for so graciously allowing impersonal behavioral observations by strange anthropologists and psychologists and to Patricia Evans, Hope Hallock, Nan Hannon, Nancy Kimmerly, Christina Larson, Laura Scaramella, and Donald Shannon for assistance in data collection and analysis. We acknowledge and thank the government of the Central African Republic for authorizing the research. We also thank James Woodburn and Nurit Bird-David for their comments on earlier drafts. The National Institute of Child Health and Human Development and the Swan Fund supported the research.

interpret others' behavior and plan their own courses of action. They provide the basis for understanding and reading the intentions of others. They are rather conservative in that children who have been consistently rebuffed by their primary caregivers are not likely to seek or accept comfort if a temporary caregiver is more sensitive. However, they are not fixed. Threatening or distressing events (e.g., early death of family members, unexpected divorce, life-threatening illness, regular but unpredictable natural disasters) can alter them. It is important to view internal working models from a life-course perspective because particular cultural institutions and ecologies, such as formal education (which ranks children on a near-daily basis), immediate and strict patrilocal residence (i.e., visits to wife's family limited), or living in ecologies with regular but unpredictable disasters (e.g., typhoons, earthquakes) can contribute to an insecure sense of self, others, and the environment even when early experiences foster security. It is also important to remember that the organization of an individual's attachment behaviors is based not only upon internal working models but also upon such factors as the availability of attachment figures (whether a parent or a spouse), the duration of the attachment relationships, and the frequency with which separations occur (Fraley 1998).

Several components of the theory of internal working models are useful additions to anthropological approaches that emphasize mental representations:

1. Internal working models develop in a context of multisensory communication. The tone, sensitivity, and appropriateness of caregiver-infant vocalizations, eye and body movements, sounds, and smells all contribute to the development of a model. These models develop in a prelinguistic context. By contrast, most cognitive approaches emphasize verbal and linguistic communication.

2. Internal working models are affectively charged in that they pattern how an individual feels about others and self. They are basic emotional/visceral reactions and do not require conscious mediation for their acquisition or use. By contrast, existing symbolic approaches seldom discuss emotional dimensions of culture and cognition.

3. Internal working models emphasize what individuals actually experience rather than semantic information or knowledge (i.e., episodic versus semantic schemas [D'Andrade 1996]).

4. Internal working models are dynamic and generalized. They are modified during the life course and aid the individual in perceiving and interpreting events.

5. Internal working models contribute to the conservation and persistence of culture over space and time because they are emotionally based representations of self and others (Freedman and Gorman 1993).

6. The development of internal working models involves biologically and agent-based processes that are an integral part of human nature. Infants actively try to negotiate and manipulate their caregiving environments in order to enhance their own survival and fitness. By contrast, most cognitive approaches in anthropology seldom mention biology and assume that the children are relatively passive recipients of culture.

The concept of internal working models is powerful and useful because it links experience, emotions, cognition, and biology. It is an integrated and holistic approach to understanding a key mechanism that shapes and transmits culture.

Cultural and critical anthropologists will, however, be quick to point out that the terms "secure" and "insecure" are culturally biased constructions. Securely attached children are said to be well-adjusted while insecurely attached children are seen as deviant or problematic, even though recent research (Lamb et al. 1984, Main 1990, Chisholm 1996, Belsky 1997) suggests that children classified as insecure are responding to their social and caregiving environments in ways that enhance their survival and fitness. Caregivers who do not respond empathetically to their infants may be experiencing social (e.g., divorce, death, serious illness, moving to unfamiliar environment) or economic stress or may have other reproductive priorities. Main (1990) indicates that "aloof and detached" children (often called "avoidant/insecure" by attachment theorists) are trying to avoid provoking their parents or withdrawing in order to begin establishing a high degree of self-sufficiency, while "clingy and dependent" children (called "resistant/insecure") are trying to elicit care and attention from rejecting and insensitive parents. An interactional style that lacks much empathy or sensitivity might also prepare a child to mistrust others in a volatile environment.

METHODS

Attachment theory indicates that early experiences contribute to the development of a child's internal working model of others and self (Lamb et al. 1984). As does Bird-David, we suggest that foragers are, in general, more likely than peoples with other modes of production to develop trusting and confident views of others, the self, and the environment. In order to determine whether foragers might have distinctive internal working models, we examined the daily experiences of three-to-four-month-old infants in three cultures with contrasting modes of production: Aka foragers and Ngandu farmers from central Africa and upper-middle-class urban Euro-Americans from the Washington, D.C., area. More extensive but less precise cross-cultural ethnographic data were utilized to examine the potential for a pan-forager pattern.

We focused on three-to-four-month-olds because this is when the various neural components of specific states (e.g., distress, sleep) become intercoordinated as infants clearly begin to recognize and behave differently towards specific individuals sometime after the second month of life (Ainsworth 1973). Our analyses emphasize three types of caregiver-infant interaction—holding/touching, feeding, and fussing/crying. These experiences provide clues regarding caregivers' predictability, reliability, and sensitivity to their infants.

Twenty Aka, 21 Ngandu, and 21 Euro-American fam-

ilies with three-to-four-month-old infants participated in the study. Families were observed for 3 hours on each of four different days in and around their homes for a total of 12 hours per family. Observations were infant-focused. Families were asked to pursue their everyday activities while ignoring the presence of the observer. Aka and Ngandu were observed from 6 A.M. to 6 P.M. every day of the week, whereas the Euro-Americans were observed from 8 A.M. to 8 P.M. on weekdays. Evening observations were conducted with the Euro-Americans so that fathers would be available at least part of the observation time. Some Euro-American fathers are staying home part of the day to help out or spend time with their infants.

Observers noted on a checklist the occurrence of 25 caregiver or infant behaviors as well as the location, position of infant, and presence of others (see Hewlett et al. 1998 for methodological details). The observer watched for 20 seconds and recorded for 10 seconds for a 45-minute period, then took a 15-minute break before starting the next 45 minutes of observation. Qualitative methods such as participant observation, informal interviews, and key-informant interviews were also employed to place the quantitative behavioral data in cultural context. (Structured interviews with parents will be reported elsewhere.)

A few distinguishing features of the three cultures may be briefly mentioned: Aka live in camps of 25–35 related people and move camp several times a year for various reasons (e.g., better hunting, a death in camp). Aka rely primarily upon cooperative net hunts that involve men, women, and children. Aka houses, dome-shaped, are built by women and have just enough room for a 4-foot-long log bed and a fire. Houses are very close to each other (1–2 feet), so all camp members live in an area about the size of a large living and dining room in the United States (see Hewlett 1991). The frequency and scope of sharing are greatest among the Aka, who share food and material items with many individuals in different households on a daily basis. Egalitarianism is emphasized at the individual level; although there is a clear sexual division of labor, men and women of all ages are respected for their abilities and contributions.

Ngandu women are the primary providers for their families. Ngandu men clear and burn the plantations, while women plant, weed, harvest, and prepare all subsistence food items (manioc, corn, peanuts, plantains). Ngandu live in sedentary communities of about 100–400 people alongside roads. Ngandu men built the mud-and-thatch houses, which are about 40 feet by 20 feet and have one to three rooms. Polygyny is common among the Ngandu (one-third of men have more than one wife), and each wife has her own room or house. Houses are about 40 feet from each other, but there are no walls or fences between them. The Ngandu focus on maintaining egalitarianism and sharing between households; households that accumulate more than others and do not share with neighboring family members are prime targets of sorcery, which is believed to cause illness and even death. Sharing between households is not frequent (i.e., not daily), however, and there is marked inequality within Ngandu households—men and older individuals receive more deference, respect, and resources than others. Men and women participate in very few activities together, and men eat separately and receive bigger portions of meat. Ngandu often note the extensive nature of Aka sharing and intergenerational equality. One Ngandu man noted that you can give an Aka man a cigarette and he will share it with everyone in camp, including children. Ngandu also note that Aka children call their parents by their first names, which from an Ngandu vantage point demonstrates disrespect.

Although Aka are primarily foragers and Ngandu farmers, all Aka today farm at least part of the year, and most Ngandu, men in particular, spend part of the year in the forest hunting or gathering forest products. Aka fields are deep in the forest, and Ngandu-style houses are built near them.

The Euro-Americans in the study lived in apartments, townhouses, or single-family homes in the more affluent suburbs of Washington, D.C. Both men and women worked outside of the home. All of the fathers were employed full-time, while none of the mothers was working outside of the home during the observation period. All but one of the mothers had been employed full-time before their infants' birth but had taken leave from their jobs to care for them. Most had returned to work by the time the infants reached 12 months of age. Mean family income was over $80,000 per year in 1991. The Euro-Americans had many of the features of so-called yuppies—well-educated middle-to-upper-middle-class families with one infant. By comparison with Aka and Ngandu, they were the least likely to share (i.e., in scope and frequency), and accumulation by individuals and households is encouraged and highly valued. Gender egalitarianism was somewhere between that of Aka and that of Ngandu. Euro-American husbands and wives ate, slept, and performed many activities together, as do the Aka, but there was more violence directed against spouses and children among them. For instance, Hewlett has worked with Aka for over 25 years and has yet to see a husband hit a wife. Hitting a child is also rare and is cause for divorce.

RESULTS

Holding, feeding, and fussing/crying experiences of Aka, Ngandu, and Euro-American three-to-four-month-olds were examined in detail. Konner's (1976, 1977) data on !Kung infants were included where possible because these are probably the best-known forager infants in anthropology, but Konner's data collection methods were different from those utilized in this study and therefore the !Kung data were not included in the statistical analyses.

Holding/touching. Figure 1 portrays the proportion of time the infants were held/touched during daylight hours and over a 24-hour period. The 24-hour data are estimates and assume that the Aka, Ngandu, and !Kung infants slept next to caregivers during evening hours while the Euro-American infants slept in cribs. The

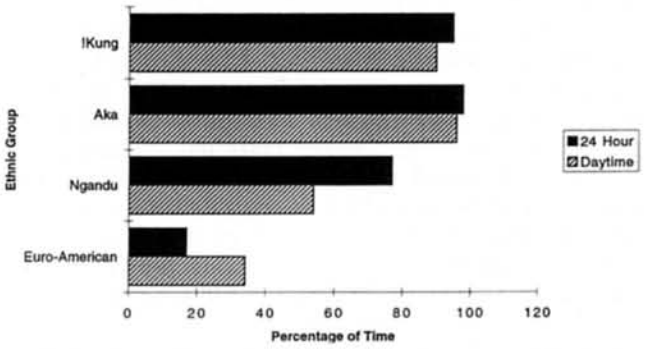

FIG. 1. *Mean percentage of time infants in four cultures are held/touched during daylight hours and over a 24-hour period.*

!Kung holding data are based upon spot observations of infants in the camp throughout the day.

Aka and !Kung forager holding/touching were remarkably similar, whereas highly significant differences existed among the three study groups (analysis of variance $F = 109.0$, 2 d.f., $p = .000$). The differences between Aka and the other two groups occurred, in part, because the others put their infants down when they fell asleep whereas the foragers continued to hold/touch their infants while they slept. Ngandu held their infants 44% of the time when they slept and 60% of the time while they were awake, while Aka held their infants 94% of the time while they slept and 98% of the time while they were awake. The Euro-American infants were held 22% of the time while sleeping and 44% of the time while they were awake. The asleep-versus-awake holding differences are highly significant for the Ngandu and Euro-Americans ($p < .001$ in both cases) but not for the Aka.

Researchers have previously described dramatic differences in the amount of holding/touching between foraging and urban industrial societies (e.g., Konner 1976), but this is the first study to suggest significant differences between foragers and farmers. Observers of farmer-infant interactions have emphasized frequent bodily contact, but a careful reading of these studies indicates that infants were less likely to be held while they were asleep during the day. Kipsigis caregivers held/touched their five-month-old infants 80% of the time the infants were awake but only 30% of the time while they were asleep (Super and Harkness 1982). LeVine et al's. classic study of the Gusii also draws attention to the regular proximate caregiving but states that at three months "the baby sleeps a great deal and is put down on a mat" (1994:157).

Feeding. Table 1 summarizes the frequency and duration of infant feeding. There were no statistical differences among the three groups in the percentage of intervals in which infant feeding occurred, but there were significant differences between Aka and Ngandu ($t = -4.90$, 33.01 d.f., $p < .001$ [two-tailed] and Aka and Euro-Americans ($t = 2.31$, 37.39 d.f., $p < .05$ [two-tailed]) in the frequency of feeding/nursing bouts. Aka caregivers fed their infants about twice as frequently as did Ngandu or Euro-American caregivers. Aka and !Kung foragers, however, were remarkably similar in the frequency of feeding bouts—about four times an hour. It is important to note, however, that the Aka, Ngandu, and Euro-American data are limited to 3–4-month-olds in several contexts while the !Kung data encompass 3–40-month-olds in camp settings only. The observational methods employed with the !Kung were similar to ours in that feeding was coded every 30 seconds and bouts were defined as sequences of intervals separated by at least one interval.

TABLE 1
The Feeding of Three-Month-Old Infants among Aka Foragers, Ngandu Farmers, and Euro-Americans

	Aka	Ngandu	Euro-Americans
Number of infants	20	21	21
Percentage of daylight hours spent feeding	15.2	12.6	12.5
Mean number of feeding bouts per hour	4.0	2.2	1.6
Mean number of minutes spent feeding per hour	9.1	7.7	7.5
Mean number of minutes per feeding bout	2.4	3.4	4.7
Percentage of infants receiving nonmaternal breast-feeding	55.0 (11/20)	9.5 (2/21)	0.0 (0/21)
Mean percentage of intervals in which infants received nonmaternal breast-feeding (with range)	8.4 (0–49)	1.6 (0–27)	0.0
Percentage of infants receiving nonmaternal feeding (including breast-feeding)	75.0 (15/20)	19.0 (4/21)	33.3 (7/21)
Mean percentage of intervals in which infants received nonmaternal feeding (with range)	8.6 (0–49)	4.4 (0–44)	0.3 (0–4)
Percentage of infants receiving water or (for Euro-Americans) bottle as part of feeding	20.0 (4/20)	47.6 (10/21)	52.4 (11/21)
Percentage of infants receiving some solid foods	10.0 (2/20)	33.3 (7/21)	n.d.

NOTE: The 17 !Kung infants (3–40 months old) studied by Konner and Worthman (1980) were fed for 13% of daylight hours; mean number of feeding bouts per hour was 4.1, mean number of minutes spent feeding per hour 7.8, and mean number of minutes per feeding bout 1.9.

Ngandu and Euro-American feeding patterns were similar in that infants were fed about twice an hour. These feeding rates are similar to those of horticulturalists such as the Gainj of New Guinea, where young infants nurse about twice an hour for about 3.5 minutes per session (Wood et al. 1985). The Euro-Americans in this study were quite distinct from those in other studies because more mothers breast-fed and took time off from work to care for their infants. Barr et al. (1989) reported that Euro-American caregivers fed their infants 5 to 7 times in a 24-hour period with a median of 3-hour intervals, whereas the parents in this study fed their infants 14 times on average during 9 hours of observation. Most mothers had returned to work by the time the infants were six months old, so presumably there was a dramatic drop in feeding frequency over time. Both bottle- and breast-feeding were utilized by several families.

The Aka were distinct in the frequency with which women other than mothers breast-fed infants. This is the only study to use the same observational methods to compare forager and farmer nonmaternal breast-feeding, and the data indicated significant differences in the number of infants who experienced nonmaternal feeding ($\chi^2 = 9.8$, 1 d.f., $p < .005$) and the amount of time infants were fed nonmaternally ($t = 2.06$, 26.2 d.f., $p < .05$). Nonmaternal feeding is known in several societies (56 of the 65 cultures studied by Raphael [1973] "permitted" women other than mothers to breast-feed infants), but, as the data in this study suggest, it may be more pervasive in foraging societies. Two societies widely recognized in the anthropological literature for the high frequency of nonmaternal breast-feeding are both foraging communities—the Efe of the Ituri Forest (Tronick, Morelli, and Winn 1987) and the Andaman Islanders (Radcliffe-Brown 1964).

Fussing and crying. Table 2 summarizes the duration and frequency of fussing and crying in the three groups. Duration is represented by the percentage of 30-second units in which either fussing or crying were observed. Infants often do not cry/fuss during the complete 30-second interval, so the actual duration of fussing and crying is somewhat less than that reported. Ngandu infants fussed and cried significantly longer and more frequently than infants in the other two groups, Euro-American infants were intermediate in fussing but cried about the same percentage of time as Aka infants. They were similar to Ngandu infants in frequency of fussing. Aka infants cried or fussed the least (4.7% total, 3.38 times per hour) and Ngandu infants the most (13.24% total, 6.27 times per hour).

It is important to remember that the internal working model is influenced by the baby's conclusions about the probability that its distress signals will elicit predictable responses. If a caregiver never responds, then there is no information, and if the caregiver responds randomly whether or not the infant is crying, there is no predictable response. Most behaviors, of course, happen both when it is crying and when it is not, so the clarity of the response depends on how much more/less likely the behavior is to occur given fussing/crying.

TABLE 2

Mean Percentage of Time and Frequency of Fussing or Crying among Aka Foragers, Ngandu Farmers, and Euro-Americans

	Aka	Ngandu	Euro-Americans
Mean percentage of time fussing	3.06	9.45	6.33
Mean percentage of time crying	1.66	3.79	1.80
Mean frequency of fussing per hour	2.59	4.69	4.38
Mean frequency of crying per hour	0.89	1.58	1.02

Given the importance of predictable response, table 3 lists base rates (percentage of intervals in which the behavior occurs when infant is not fussing or crying), co-occurrence rates (percentage of intervals in which the behavior occurs when the infant is fussing or crying), and difference scores for eight possible caregiver responses (physical soothing, nonphysical soothing, feeding, holding, vocalizing, stimulating/arousing, caregiving, and no response). Two such scores are listed: (1) the difference between the base rate and the co-occurrence rate and (2) a proportional rate which is the log of the ratio between the co-occurrence and base rates. The scores show the magnitude of the difference between base rates and co-occurrence rates. The ratio of the nonbehavior rates with and without fussing/crying estimates the reliability with which caregivers responded to their babies. Overall, the responsiveness signal was much clearer for Aka infants than for infants in the other groups and least clear for the Ngandu.

Because the Aka infants were almost always held, fussing and crying had little effect on that behavior. By contrast, Euro-American infants were more likely to be held when either fussing or crying, while crying had minimal association with holding among the Ngandu. In all groups, caregivers were more likely to be observed soothing infants when the latter were crying or fussing, although this was proportionately less common among the Ngandu. Aka caregivers were more likely to soothe physically (e.g., by walking or rocking the infant) their fussing or crying infants than were caregivers in the other groups. Aka caregivers spent slightly more time feeding infants than did caregivers in the other groups and, in contrast to both, were more likely to feed them when they fussed than when they did not.

Stimulating/arousing was not common among the Aka and Ngandu; it was more common among the Euro-Americans, who tended to stimulate/arouse more as a means of distracting fussy infants. Like caregivers in the other groups, however, they seldom stimulated/aroused infants who were crying. They also vocalized much more than did Aka and Ngandu caregivers, although caregivers in all groups vocalized more when their infants fussed or cried. In most instances, however, this vocalizing co-

TABLE 3
Behaviors That Co-occur with Fussing and Crying in Three Cultures

	Aka				Ngandu				Euro-Americans			
Behavior	Base Rate[a]	Co-occurrence Rate[b]	Difference	Proportional Difference[c]	Base Rate[a]	Co-occurrence Rate[b]	Difference	Proportional Difference[c]	Base Rate[a]	Co-occurrence Rate[b]	Difference	Proportional Difference[c]
Fussing												
Physical soothing	2.2	41.2	39.0	1.27	1.7	28.1	26.4	1.22	1.0	20.3	19.3	1.31
Nonphysical soothing	1.5	26.0	24.5	1.24	1.8	25.6	23.8	1.15	1.0	29.6	28.6	1.47
Soothing overall	2.8	48.2	45.4	1.24	2.4	31.9	29.5	1.12	1.4	37.7	36.3	1.43
Feeding	15.0	22.5	7.5	0.18	12.7	12.1	−0.5	−0.02	12.9	7.5	−5.4	−0.23
Vocalizing	3.2	25.8	22.6	0.91	2.4	7.1	4.7	0.47	32.5	51.0	18.5	0.20
Vocalizing only	1.4	1.1	−0.3	−0.10	1.4	2.0	0.6	0.15	16.6	18.3	1.7	0.04
Caregiving	5.0	7.3	2.3	0.16	6.3	8.0	1.7	0.10	8.3	13.8	5.5	0.22
Stimulating/arousing	0.6	0.5	−0.1	−0.08	1.7	1.9	0.2	0.05	8.0	10.3	2.3	0.11
None of the above	76.2	27.8	−48.4	−0.45	77.2	51.1	−26.1	−0.18	54.4	27.5	−26.9	−0.30
Holding	95.9	99.9	4.0	0.01	54.2	52.0	−2.2	−0.02	34.6	45.0	10.4	0.11
Crying												
Physical soothing	2.6	48.9	46.3	1.27	3.2	29.9	26.7	0.97	1.5	38.1	36.6	1.40
Nonphysical soothing	1.6	40.3	38.7	1.40	2.9	34.0	31.1	1.07	2.0	46.7	44.7	1.37
Soothing overall	3.2	59.2	56.0	1.27	3.8	40.0	36.2	1.02	2.7	57.2	54.5	1.33
Feeding	15.2	15.0	−0.2	−0.01	12.6	14.3	1.7	1.13	12.6	9.6	−3.0	−0.12
Vocalizing	3.3	39.7	36.4	1.08	2.7	6.4	3.7	0.38	33.5	43.7	10.2	0.11
Vocalizing only	0.2	0.3	0.1	0.18	1.8	0.8	−1.0	−0.35	16.8	12.8	−4.0	−0.12
Caregiving	4.9	14.4	9.2	0.47	6.0	17.8	11.8	0.47	8.5	17.9	9.4	0.32
Stimulating/arousing	0.6	0.0	−0.6	0.00	0.8	0.3	−0.5	−0.43	8.2	2.5	−5.7	−0.51
None of the above	75.6	18.9	−56.7	−0.60	75.9	41.8	−34.1	−0.26	53.3	16.2	−37.1	−0.52
Holding	95.8	99.7	3.9	0.02	54.0	59.0	5.0	0.04	34.2	57.7	23.5	0.23

[a]Percentage of intervals in which behavior occurs when infant is not fussing/crying.
[b]Percentage of intervals in which behavior occurs when infant is fussing/crying.
[c]Log of co-occurrence rate divided by base rate.

occurred with other soothing behaviors; Table 3 shows that vocalizing only was extremely rare among Aka and Ngandu and occurred about as frequently when infants were not fussing or crying.

The table also shows that the probability that caregivers were engaged in none of the target behaviors dropped dramatically when the infants either fussed or cried. The change was particularly marked among the Aka, who were as likely as the Ngandu not to be engaged with their infants when they were quiescent but as likely as the Euro-Americans to be attending to their infants using one of the target behaviors when they were crying or fussing.

In order to obtain a clearer picture of the frequency of no response to fussing/crying, we examined fussing/crying "events"—a continuous sequence of 30-second intervals in which some fussing/crying occurred separated by at least one interval without fussing/crying. We also examined the interval following the last fussing or crying event to see if there was a response, with the thought that fussing or crying might have occurred at the end of an interval with the response being recorded in the following one. Figure 2 summarizes four types of responses that took place during at least one interval of a fussing/crying event. Physical and nonphysical soothing were combined, and vocalizing was dropped because it usually occurred with soothing; vocalizing only and stimulating/arousing were omitted because their base rates were similar to rates when the infant was fussing or crying. Caregiving was omitted because it was not clear whether it actually increased the frequency of fussing and crying.

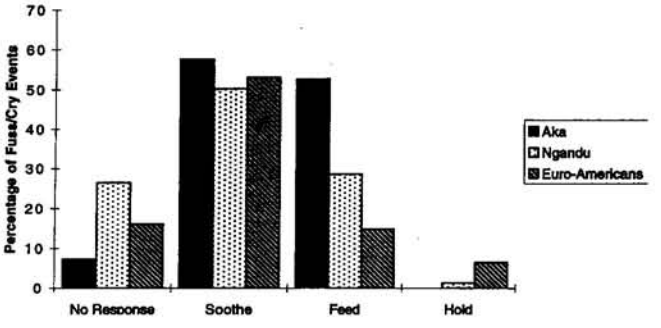

FIG. 2. *Types of responses to fussing/crying events.*

Holding was considered a response only if the infant was not being held before the fussing/crying event.

Figure 2 shows that lack of response to a fussing/crying event was substantially less frequent than is suggested by the interval data in table 3 (i.e., no response 20–50% of the time). The three groups were statistically distinct from each other, with the Ngandu having the highest frequency of no response and the Aka the lowest. The fussing/crying event data were consistent with the interval data in that soothing was a common response in all groups, feeding was especially common among the Aka, and holding was more common among the Euro-Americans.

The Ngandu infant fussing/crying data may seem unusual because it is often assumed that caregivers in non-Western cultures are much more responsive to infant fussing or crying than are caregivers in urban-industrial cultures and that as a result infants in these cultures cry less overall. But, in fact, few data exist on responses to fussing/crying events in small-scale cultures. LeVine has written the most about how responsive agricultural caregivers are by comparison with urban-industrial caregivers, but his Gusii and Boston fussing/crying data are based upon one hour of observation per infant at each age point. LeVine et al. reported that Gusii fuss/cry less (1994:201) than Boston Euro-Americans, but no statistical support was provided. The tables and figures indicate that Gusii three-to-four-month-olds cry more in more than 30% of the observations and that crying is the most frequent behavior at this age; infant vocalization, looking, physical contact, and exploring are all less frequent than crying (1994:207–8). By comparison, crying was the third most frequent behavior in a sample of infants in Boston (Richman, Miller, and LeVine 1992). Other studies of infants in East Africa suggest that farmers may not be especially responsive to infants' crying: Munroe and Munroe (1984) indicated that Logoli caregivers did not respond to 25% of infant crying episodes, and Borgerhoff Mulder and Milton (1985) stated that Kipsigis caregivers did not respond to 15–20% of infants' cries. It is also possible that the non-Western caregivers are described as so responsive in these studies because they are being contrasted with Euro-American parents in the 1960s and 1970s, when parents had more children and often relied upon Dr. Benjamin Spock, who at the time recommended letting children cry so that they could learn independence. For instance, Bell and Ainsworth's 1972 study of U.S. infants indicated deliberate nonresponse to 46% of crying episodes during the first three months. It is again important to consider the relatively high socioeconomic status and specific circumstances (i.e., mothers with a firstborn staying home specifically to be with the infant) of the Euro-American parents in this study.

The results of Barr et al.'s study (1991) of !Kung crying are consistent with this study in that forager infants cried less and caregivers were more responsive than Euro-American infants and caregivers. At three months !Kung infants cried 3.7 minutes per waking hour while Dutch infants cried 7.2 minutes. If we assume that infants sleep about 30% of the time and do not cry during that time, the Aka would cry 3.4 minutes per waking hour while the Euro-American infants would cry 6.8 minutes per waking hour. But it is important to be cautious in making comparisons with !Kung infants because the data collection methods were so different—three-month-old !Kung infants were observed for a total of 90 minutes in the camp, and the observations took place only when the infants were awake, not in the sling at the mother's side, not nursing, and within 15 feet of their mothers.

Cross-cultural data. A less precise but more comprehensive comparative analysis of infants' experiences in two very broad categories of cultures—tropical foragers and other nonindustrial peoples—is summarized in table 4. The table is a modified version of one created by Lozoff and Brittenham (1979) using data from Barry and Paxson's cross-cultural infancy codes (1971) for the 186 cultures in the Standard Cross-Cultural Sample (Murdock and White 1969). Lozoff and Brittenham distinguished tropical hunter-gatherers from other nonindustrial cultures (some of which were foragers) because this was thought to be the environment of evolutionary adaptation. The cross-cultural data tend to support the patterns described in this paper in that forager infants are held more frequently and are somewhat more responsive than infants in other nonindustrial cultures.

Rohner (1986) also conducted a study of parental warmth and affection versus rejection towards two-to-six-year-olds in 101 cultures and found rejection of children absent in forager societies and significantly more common in agricultural and pastoral societies.

DISCUSSION

Attachment theory posits that social-emotional experiences with caregivers contribute to the development of internal working models of self and others which become a social-emotional baseline for predicting and understanding feelings towards and interactions with others. We examined infant-caregiver experiences among three-to-four-month-olds in three groups with different modes of production in an attempt to determine whether there were distinctive features in the development of internal working models among foragers. In general, our data sup-

TABLE 4
Infant Care Practices (Percentage) among Foragers and Other Nonindustrial Cultures, Farmers, and Urban Industrial Cultures (Modified from Lozoff and Brittenham 1979)

Infant Care Practices	Tropical Foragers[a]	Other Nonindustrial Cultures[b]
Infant carried or held more than 50% of the time until age of crawling	100	56
Infant carried with sling or no carrying device (vs. cradle board, basket, or infant seat)	90	76
Generally affectionate care in infancy (expressions of affection, permissiveness, immediate response to demands)	100	72
Immediate, nurturant response to crying	100	74

[a]Foragers living between 22°30′ N and 22°30′ S; includes !Kung, Hadza, Mbuti, Semang, Vedda, Tiwi, Siriono, Botocudo, Shavante, and Chenchu.
[b]The remaining 176 cultures of the Standard Cross-Cultural Sample (Murdock and White 1969).

port Bird-David's suggestion that pan-forager meta-metaphors (schemas) exist and that foragers are more likely than individuals in cultures with other modes of production to have trusting and giving views of others and the environment. Infants in foraging cultures are more likely than infants in horticultural or urban-industrial cultures to be held, breast-fed on demand, breast-fed by women other than their mothers, and responded to sensitively when fussing or crying. These cultural experiences contribute to the development of trusting, accepting, and giving internal working models, mechanisms important to the survival and fitness of the child (e.g., ability to read and predict the intentions of others) as well as to the persistence of culture. Our approach supplements Bird-David's work in that it identifies a specific mechanism by which pan-forager schemas develop and are culturally transmitted and conserved.

Internal working models help to explain why African forest foragers ("pygmies") with diverse subsistence techniques (e.g., net, bow or gun hunters, gatherers, trappers, etc.), kinship systems (e.g., Hawaiian or Iroquois), relations with farmers (e.g., close or distant), and levels of acculturation (e.g., spend most of the year in village or forest) have similar social relations. Social relations are influenced by how one views self and others. For instance, Hewlett has traveled extensively in central Africa and has observed enormous diversity in forest foragers' ways of life, but within this diversity he has experienced a style of social interaction that is common to foragers and quite distinct from that of neighboring farmers. We suggest that early interactional experiences and the consequent development of internal working models explain, in part, the commonalities in forager (or farmer) social relations. The implication is that internal working models and consequent style of social relations can generate a diversity of cultural institutions, kinship systems, social roles, and sharing patterns (Fiske 1991). The distinguishing feature of forager or farmer lifeways may be the nature of social relations rather than subsistence techniques or kinship and descent patterns.

Suggesting that there is a pan-forager pattern of any sort is not popular in anthropology today; many anthropologists question whether the term "forager" is even useful. We agree with Kelly (1995) and others that foragers have/had a diversity of social systems, subsistence systems, and mating patterns, but we suggest that within this diversity there are patterns of social relations that are distinct from those of most agriculturalists. Without a doubt, there are or were foragers or farmers who do not fit the patterns described here. The Hadza, for instance, may not; Blurton Jones (1993) indicates that Hadza caregivers let their infants cry for long periods and are not very indulgent. While we do not expect forager groups or individuals to fit the pattern, we do feel that most (> 90%) immediate-return or mobile foragers will fit at least several aspects of the pattern.

It is important to note that what happens in early infancy does not in and of itself determine adult feelings and perceptions about self, others, and the environment. Furthermore, children in each of the three cultures in this study experience childhood and adolescence in very different contexts—involving different physical and social settings, cultural expectations of children, cultural practices with regard to children, and general cultural institutions and schemas—and each stage of development influences their internal working models. It is not possible to review the typical life course in each of the three cultures, but a few brief examples will illustrate the importance of viewing internal working models from a life-course perspective.

Aka children grow up in a cultural system that minimizes ranking, whereas Euro-American children move into a system that ranks individuals on a nearly daily basis. Even when they have sensitive caregivers and initial trusting internal working models, the ranking institutions point out differences between individuals which may in turn influence views of self and others. Aka and Ngandu children grow up among the same familiar individuals throughout their lives, whereas Euro-American children frequently change schools, classrooms, teams, and neighborhoods. Aka and Ngandu children's friends know them very well and are in a better position than Euro-American children's friends to interact or respond in sensitive and multisensory ways.

Attachment theory is not explicitly concerned with the development of feelings and views towards the natural environment, but several ethnographers (Bird-David 1993, Ingold 1987, Milton 1996, Mithen 1996) have described the links between social and natural ecologies. Early infant experiences and the hypothesized internal working models described in this paper reflect the Aka and Ngandu views of the environment. The Aka have a trusting or giving view of the environment and view the landscape as an integral part of their social world—they engage with the natural environment as trusting sharing partners. They trust that, under normal conditions, the forest will provide food. As Ichikawa (1992) points out, this does not mean that foragers have a completely positive, romantic view of the environment; food shortages, accidents, and malevolent spirits cause problems on a regular basis, but these are consistent with the ups and downs of any social relationship. As early experiences and internal working models would predict, Ngandu are generally suspicious and fearful of both the natural and social environment even though they know both the forest and "others" in their social environment quite well. A number of malevolent spirits—ancestral to generalized spirits—can cause harm at any time, and sorcery accusations are a topic of daily conversation and concern. Our analysis of Ngandu infant care practices provides an explanation for these distrustful views.

The link between the early experiences of Euro-American infants and Euro-American views of the natural environment (e.g., the human-nature dichotomy) is less clear, in part because Euro-Americans do not live in a forest or other "natural" environment. Their environment is the suburb, and children are constantly cautioned not to trust everyone. Euro-Americans' views of their social environment, therefore, are at least somewhat consistent with the infancy data presented here.

There are several limitations to this study. First, we do not directly examine internal working models as a developmental psychologist might, by administering standardized tests. Instead, we assume that certain infant experiences shape the development of such models. Also, attachment theory has seldom been used to explain intercultural variability. Second, while we provide cross-cultural evidence to support Bird-David's hypothesis regarding forager schemas, we present few descriptive data to test her hypothesis that these schemas impact economic behavior. Intracultural data linking early experiences and economic behavior are needed.

Third, we examine the development of internal working models at a single age point. Data on Aka and Ngandu at nine-to-ten months of age suggest that the patterns observed at three-to-four months continue—Ngandu infants fuss/cry significantly more than Aka, and Aka continue to hold infants twice as much as Ngandu—but we do not know much about changes later in life. Fourth, the cross-cultural data on infancy have an African bias.

A fifth limitation is that the views of "others" considered here are Aka, Ngandu, and Euro-American views of members of their own ethnic group (and, for the U.S. sample, socioeconomic stratum). Aka generally trust other Aka, but they often distrust the Ngandu. Other biocultural mechanisms and processes (e.g., other marker traits, repeated negative experiences, kin selection) may influence these behaviors.

Finally, it is important not to draw conclusions about these cultures on the basis of this limited description. Ngandu children, for instance, are very self-assured, and Ngandu parents are in fact more interactive (i.e., providing more verbal and physical stimulation) with their infants than are Aka in late infancy. Euro-American parents are more interactive and stimulating than both Aka and Ngandu.

CONCLUSION

We have examined Bird-David's (1992) hypothesis that foragers are more likely than peoples with other modes of production to have "giving" metaphors/views of the natural environment. We were interested in explaining why the cognitive models or schemas that she describes existed among many foragers in diverse natural and social ecologies and how they were transmitted from generation to generation. We identified a holistic emotionally based mechanism, the development of internal working models, which partially explained the intergenerational transmission and social reproduction of the trusting view of others and the environment that is common to many foragers. The social-emotional experiences of Aka forager infants were compared with the early experiences of Ngandu farmers and urban Euro-Americans. Aka infants were held/touched substantially more, breast-fed more frequently by more people, and responded to more regularly and contingently than infants in the other two groups. Descriptive cross-cultural data supported the quantitative case-study data. Early experiences provide a social-emotional baseline for viewing, interpreting, and predicting the actions of others. The internal-working-model approach explains, in part, why trust and giving are common in forager social-emotional-economic relations despite the enormous diversity in their natural ecologies, subsistence techniques, kinship systems, and levels of acculturation.

We have also described a pattern of infant care distinct from that of farmers. Prior to this study, infancy was thought to be similar in foraging and farming cultures with respect to the measures discussed here (bodily contact, nursing, attention to fussing/crying) because both foragers and farmers have high infant mortality. Bird-David also suggested that these giving metaphors/schemas for viewing the environment explain the extensive sharing, minimal time spent in subsistence activities, and lack of storage among foragers. While our data are consistent with her predictions, we have been unable to test this aspect of her hypothesis directly.

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