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# Parent-Offspring Weaning Conflicts among the Bofi Farmers and Foragers of Central Africa<sup>1</sup>

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Parent-offspring conflict theory suggests that the reproductive interests of parents and children may conflict when parents want to have another child and an existing child wants continued parental attention and resources. This conflict leads toddlers to throw temper tantrums and use other psychological weapons to maintain parental investment. Few studies employing this theory have considered both the cultural and the biological contexts of weaning. Using systematic qualitative and quantitative data collected among the Bofi farmers and foragers of Central Africa, we examined the influence of cultural schemas and practices, nursing patterns, child's age, maternal pregnancy, and maternal work patterns on children's responses to the cessation of nursing. As predicted by the theory, Bofi farmer children exhibited high levels of fussing and crying when abruptly weaned while Bofi forager children showed no marked signs of distress. Differences in child care practices associated with the cessation of nursing contributed to this variation, and these practices are linked to broader differences in cultural schemas and social relations. These findings are used to discuss intersections between culture and biology and to show that parent-offspring conflict theory can accommodate a diversity of contexts.

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Weaning from breastfeeding<sup>2</sup> is a complex process that involves not only the cessation of nursing but also nutritive and social changes for children. As a result, weaning has implications for broader theoretical issues in cultural anthropology. It involves the negotiation of power and agency between mothers and children. Anthropologists, psychologists, and evolutionary biologists have long recognized that weaning is a time when the interests of mothers and children do not necessarily coincide (Ainsworth 1967, Albino and Thompson 1956, Daly and Wilson 1988, Draper and Harpending 1987, Trivers 1974); children are expected to resist weaning and try to maintain care and attention while parents are preparing for the birth of a new child. Weaning is often cited as a nexus of parent-offspring conflict (Daly and Wilson 1988, Trivers 1974), and Trivers's parent-offspring conflict theory is one of the most prominent and controversial theories in evolutionary anthropology and biology. In this paper we evaluate that theory by considering how breastfeeding patterns, age of child, maternal pregnancy, maternal work, and cultural schemas and practices influence children's responses to weaning in two small-scale cultures, those of Bofi farmers and foragers of Central Africa. These farmers and foragers live in the same natural ecology, speak the same language, and interact with each other on a daily basis but are culturally distinct and have different caregiving and weaning patterns. In one of these groups mothers explicitly strive to wean children from the breast, while in the other children themselves decide when to stop breastfeeding without overt parental guidance or coercion. Our analyses are unique in that we consider the role of culture whereas previous analyses have emphasized reproductive and ecological factors. In our view, culture refers to nonbiologically transmitted schemas, social relations, and practices that may or may not be linked to reproductive fitness and ecology. Most previous anthropological studies of weaning have focused on the biological costs/benefits of weaning (Gray 1996, McDade 2001) and the influence of modes of production on infant feeding patterns (Sellen and Smay 2001), although McDade and Worthman (1998) considered the influence of cultural-ecological factors on breastfeeding practices and the high risk of child morbidity during weaning.

Trivers (1974) was one of the first theorists to depict children as active agents seeking to promote their own

2. We use the terms "nursing" and "breastfeeding" interchangeably.

survival rather than as passive recipients of parental investment. He proposed that children actively try to maximize their reproductive success and therefore try to elicit as much investment as possible from their parents. Because a parent and child share only 50% of their genes, conflicts inevitably arise with respect to the desired level of parental investment in individual children. For example, mothers may seek to promote their own reproductive fitness by weaning and conceiving other offspring, whereas children try to elicit further investment in order to enhance their own fitness. Trivers predicted that parent-child conflict would occur at many points in development because offspring have been selected to demand more than parents are willing to give; conflict is especially likely to occur when parents reduce investment in children. Because of the many benefits (nutritional and immunological) that nursing provides to infants, evolutionary theorists predict that its cessation will trigger conflict between parents and offspring because the optimal time for weaning is likely to be later for offspring than for mothers (Daly and Wilson 1988, Draper and Harpending 1987, Trivers 1974).

Trivers argued that offspring utilize psychological weapons such as temper tantrums to obtain parental investment. The use of such weapons during weaning has been observed in both human and nonhuman primates. For example, orangutan weanlings often "whine" at their mothers day and night while being weaned (Horr 1977). Among the Ache foragers of South America, weaning is "an extremely unpleasant experience for mothers (and apparently for children), with children screaming, hitting, and throwing tantrums for several weeks" (Hill and Hurtado 1996:221). Likewise, Shostak (1976) portrayed weaning, the birth of siblings, and no longer being carried on their mothers' backs as causes of "intense unhappiness" for !Kung children. Nisa, Shostak's primary informant, recalled her own weaning as a traumatic experience in which she cried all the time for her mother's milk: "Some mornings I just stayed around and my tears fell and I cried and refused food. That was because I saw him [her brother] nursing, I saw with my eyes the milk spilling out. I thought it was mine" (Shostak 1976:251). Although these are vivid depictions, they are focused on weaning as an event rather than on the process and context. Anecdotal descriptions such as these have led to the widespread assumption that weaning is distressing for children. For example, Daly and Wilson (1988:115) explained that children universally do not want to be weaned, citing the !Kung example: "Children are not impatient to be weaned, even in societies where nursing continues for several years (see e.g., Shostak, 1981). The child's attitude to mother's next pregnancy is frequently ambivalent if not downright hostile, despite parental efforts to engender enthusiasm about becoming a sibling." Parent-offspring conflicts around weaning involve sibling-sibling competition, because mothers often reduce their investment in certain offspring (e.g., weanlings) and redirect it toward other (e.g., younger) offspring. In her study of maternal decision making about weaning among Turkana pastoralists, Gray (1996) found that

weaning was often precipitated by the mother's pregnancy. Prior to pregnancy, the frequency of nursing even increased, and, "as a consequence, the event of weaning is traumatic for both mothers and children" (p. 456). By contrast, Sellen (2001) reported that weaning was not determined by pregnancy among Datoga pastoralists, proposing that instead the timing of weaning was influenced by maternal self-perceptions, perceptions of infants, seasonal food supply variations, and maternal work activities. He explained that mothers "reduce the daily frequency of breastfeeding to accommodate other activities such as collecting water and fuel wood, tending cattle, and constructing housing" (p. 240).

Children resist reductions in investment by engaging in "psychological warfare" to convince parents that they need investment more than their siblings do. Trivers (1974) uses the example of temper tantrums, whereas Daly and Wilson describe patterns of "regression" in which children exaggerate their dependency through baby talk, demands to be carried by their parents, and requests for food. They argue that, in cases of reproductive conflict, "each party may be expected to use whatever means are available to manipulate the other's behavior in the direction of one's own optimum, whether by deceit, by coercion, or by sheer nagging" (1988:97).

Although Altmann (1980) described marked weaning distress among baboon infants, she also cautioned that conflicts of interest between mothers and children do not necessarily lead to such distress. She questioned whether parent-offspring behavioral conflicts always represent conflicts of reproductive interest and proposed that they also reflect processes by which parents teach children about the ideal timing—not necessarily the amount—of investment. For example, mothers may prefer to nurse when resting rather than foraging and often reject infant suckling during such times. Altmann further suggested that the resolution of mother-child conflicts depended upon the comparative costs of the alternatives, specifically, the energetic and social costs of a temper tantrum as opposed to the potential benefits of greater parental investment. Altmann explained that a temper tantrum may mean the loss of both feeding and social interaction to a baboon infant and therefore occurs only when the possible benefits are really high. She further explained that conflicts of reproductive interest do not invariably lead to behavioral conflict, pointing to cooperation and compromise as important elements of the mother-child relationship that facilitate conflict resolution.

Altmann's observations raised important questions about parent-offspring conflict theory, but Maestriperi (2002) has argued that parent-offspring cooperation and compromise are in fact compatible with Trivers's notion. Specifically, because behavioral conflict may be detrimental to both parents and offspring and optimal parental investment is likely to differ for both parent and offspring, different resolutions are appropriate in different contexts. Furthermore, Altmann's identification of the restructuring of infant feeding schedules as a proximate cause of behavioral conflict is compatible with the the-

ory because changes in timing can accompany changes in parental investment if feeding actually decreases. Maestriepieri notes that parent-offspring conflict and behavioral conflict are focused not only on feeding but also on such issues as infant carrying, protection, and thermoregulation. As a result, infants and children are likely to have conflicts of reproductive interest with their parents about many different topics throughout their development.

Bateson (1994) has further argued that parent-offspring conflict is likely to occur at times other than weaning and that the level of resistance to events such as weaning should be dependent upon the state (e.g., health and age) of the child, which determines the relative nutritional value of breastfeeding. For example, a four-year-old child's energetic needs cannot be met through breastfeeding alone, and therefore that child should resist weaning less than a younger one. Bateson (1995), like Altmann (1980), also warned that parent-offspring conflict during events such as weaning should not be assumed. He explained, "No conflict of interest occurs if, for instance, the optimum time for weaning is the same for mother and offspring. . . . For a great many conditions, mothers and offspring pay attention to each other as a matter of enlightened self-interest" (1995:83).

Behavioral ecologists have used parent-offspring conflict theory to explain weaning distress among human and nonhuman animals, but their efforts have been controversial (Alexander 1974, Clutton-Brock 1991, Godfray 1995, Mock and Forbes 1992). Alexander was one of the first to criticize Trivers's theory, suggesting that the cost of overt conflict for offspring frequently offset the benefits of such conflict. Agrawal, Brodie, and Brown (2001) have observed that studies have focused mostly on behavioral phenotypes (e.g., overt conflict) rather than genetic processes and that the theory is based largely on untested genetic assumptions. Similarly, Godfray (1995) criticized the focus on the "battleground" rather than the resolution of such conflicts. We nevertheless focus primarily on the "battleground" of parent-offspring conflict because few systematic studies of such conflict among humans have been undertaken. We therefore illustrate the specific contexts and conditions under which parent-offspring conflicts over weaning occur among Bofi farmer and forager parents and children.

Researchers who have used parent-offspring conflict theory to predict how offspring respond emotionally to weaning have conducted ecological cost/benefit analyses, considering factors such as health, the availability of food, the weight of weanlings, and maternal reproduction (Babbitt and Packard 1990; Bateson 1994; Gray 1996; Lee, Majluf, and Gordon 1991; Lefebvre 1985; Malm and Jensen 1997; McDade 2001). Although they represent important aspects of investment, cultural factors such as the amounts and types of caregiving have not been considered. The analyses presented here are intended to broaden the scope of research by including such cultural factors.

In summary, parent-offspring conflict theory predicts that children resist weaning by using psychological

weapons such as crying and temper tantrums (Trivers 1974), younger children resist weaning more than older ones (Bateson 1994), and maternal reallocation of investment to other siblings (e.g., pregnancy) is a source of behavioral conflict (Daly and Wilson 1988, Gray 1996, Maestriepieri 2002). We will examine the behavioral responses of Bofi farmer and forager children at different stages in the weaning process and the impact of cultural context on those responses. Specifically, we examine in turn (1) the relationship between children's behavior and nursing status (e.g., weaning stage), age, cultural group (e.g., forager or farmer), maternal pregnancy, and maternal work and (2) the implications of cultural schemas and practices for the weaning process. First, however, it is necessary to provide some ethnographic background on these cultural groups, which have not been described in the literature.

## The Bofi Farmers and Foragers

The Bofi farmers and foragers live in and around the Ngotto Forest in the Ecosystèmes Forestiers d'Afrique Centrale (ECOFAC) forestry management zone of the northern Congo Basin rain forest in the Central African Republic. They have long lived alongside one another and interact daily in social, spiritual, and economic settings. The foragers spend part of the year living on the outskirts of the farmer villages and part of the year in the forest. Both groups speak the same Oubangian language (Bofi).

The Bofi foragers are the northern neighbors of the Aka foragers studied and described by Bahuchet (1985) and Hewlett (1991b). From oral history it appears that sometime during the period of the rubber trade (after 1870), some Bofi farmers and Aka foragers became closely associated and some of the Aka adopted the Bofi language and ceased to speak their own. Elderly Bofi farmers indicate that their deceased grandparents and parents spoke Aka as a third or fourth language in order to trade with nearby foragers. The groups of Aka that adopted the Bofi language are now known as the Bofi foragers. The Bofi foragers are ethnically and culturally very similar to the Aka foragers but consider themselves quite different from and unrelated to the Aka. For example, the foragers call the Aka *yidi koola*, "forest pygmy," and explain that the Aka spend much more time in the forest than they do and have supernatural powers such as the ability to transform themselves into animals. They say that they themselves cannot do this, but their ancestors could. They and the Aka have very similar material cultures, subsistence methods, social organization, and cultural values. The differences between the two groups include the Aka tendency to farm more and to spend more time in the forest (eight or more months a year) than the Bofi (three to four months of the year). Another is that the Bofi do not recognize Aka social positions such as *dzengi* (great forest spirit), *tuma* (great hunters), and *kombeti* (clan leaders) (Hewlett 1996).

## SUBSISTENCE

The Bofi foragers (like the Aka and Mbuti foragers) are primarily net hunters, although they also hunt with small traps, snares, crossbows, and spears. They hunt many animal species, including duikers, rats, porcupines, mongooses, hogs, and monkeys, and gather a wide variety of forest products, including leaves, mushrooms, roots, nuts, fruits, insects, and honey. Men, women, and children participate in net hunting and gathering. The foragers exchange forest products with the Bofi farmers for manioc and other village products daily.

The Bofi farmers subsist primarily through slash-and-burn horticulture. Their main crop is manioc, but they also grow coffee, corn, peanuts, and a variety of fruits. Farmer men also hunt periodically in the forest using shotguns and snares, while the women periodically gather leaves, insects, and mushrooms. Farmer women perform the majority of the horticultural tasks, planting, harvesting, and processing the crops and also clearing most of the fields. Men are traditionally responsible for clearing and burning the fields, although farmer men spend much of their time involved in intervillage trade and politicking within the village.

## DEMOGRAPHY

The majority of marriages among both foragers (90%) and farmers (88%) are monogamous. The Bofi farmer polygyny rate is much lower than in nearby farming villages (e.g., the Ngandu), perhaps because the farmers accumulate so little wealth (Hewlett 1991*b*). Before marriage, farmer men must pay a bride-price to their future wives' parents. Bride-prices often include palm wine, clothing, money, and food. When men are unable to pay as much as their in-laws deem appropriate, they provide bride service as well. Among the foragers, similarly, newly married couples live matrilocally while the young husbands perform subsistence-related services for their wives' families. The bride-service period is variable, ranging from one to seven years. After the bride-service period, forager couples traditionally live patrilocally, although couples often choose to continue living matrilocally.

The total fertility rate<sup>3</sup> among the foragers is 5.54 (variance = 4.34); they have a child mortality rate (birth to 15 years) of 41%. The farmers have a similar fertility rate (5.32, variance = 12.38) and a lower child mortality rate (31%), perhaps because they make use of local pharmacies and hospitals (with Western medicine) more often. Interestingly, despite their similar fertility rates the two groups have different interbirth intervals. The foragers' is four to five years and the farmers' is two to three years. One might predict a higher fertility rate among the farmers because they have a shorter interbirth interval than the foragers, but the variance in fertility rates is much higher among farmers than among foragers. In-

fertility is infrequent among forager women; out of 25 postmenopausal women interviewed, only 1 had never given birth and only 1 had given birth fewer than three times. In contrast, out of 62 postmenopausal farmer women, 4 had never given birth, whereas 15 others had given birth fewer than three times and reported having had difficulty conceiving thereafter. The similarity in forager and farmer fertility rates is consistent with the results of other cross-cultural studies (Bentley, Goldberg, and Jasienka 1993, Hewlett 1991*a*). For example, Bentley, Goldberg, and Jasienka, using a sample of 57 populations, found that mean total fertility rates were 5.6 for foragers, 5.4 for horticulturalists, and 6.6 for intensive agriculturalists.

## CULTURAL SCHEMAS

Key schemas among Bofi foragers include egalitarianism, respect for autonomy, and giving. Social organization is relatively egalitarian; women and men have essentially equal access to resources, and they do not designate chiefs. Limited status differences exist between individuals; for example, some men and women are better hunters and some have more medical knowledge. Foragers respect personal autonomy and do not sanction each other's behavior. Their subsistence patterns, like those of other net hunters (see Hewlett 1991*b*), require a high degree of cooperation. Most of the food acquired is shared extensively with camp members, and net hunting involves men, women, and children. Families often spend much of their time together hunting, gathering, and preparing food, although men sometimes hunt together and women sometimes gather together. These foragers are loosely patrilineal and patrilocal, although many individuals choose to live matrilocally even after bride service is completed.

Key schemas among Bofi farmers include age and gender inequality and communalism (i.e., placing clan and extended-family expectations above individual interests). Farmers are organized under village and clan chiefs and are strictly patrilineal and patrilocal. Individuals are often instructed by elder clan members about whom they should marry and when divorce is or is not appropriate. Gender and age hierarchies are respected, and therefore older men are usually designated as chiefs and accorded influence within their families and community.

## CULTURAL SCHEMAS AND PRACTICES RELATED TO EARLY CHILDHOOD

Bofi farmer children are expected to show deference to adults, especially older men. Farmer parents value obedience and use corporal punishment and fear as tools to modify their children's behavior. For example, children are told stories about dangerous spirits that live in the forest and are discouraged from going into the forest lest they be killed by these spirits. Children who fear particular individuals (such as strangers) markedly are often pushed toward these individuals, increasing their fear. Parents also commonly use negation terms (e.g., "no,"

3. Total fertility rate represents the average number of times women gave birth to living offspring, based upon fertility-history interviews with postmenopausal women.

“stop”) to modify children’s behavior (e.g., to stop children from playing with knives or fighting with their siblings). By contrast, the foragers exhibit considerable age egalitarianism and grant children much autonomy in daily life. Forager parents do not use fear tactics and rarely use negation, and children are not punished or coerced to behave in certain ways. Consequently, forager children do not always respond to their parents’ requests. Likewise, parents often do not intervene when forager children play with sharp objects.

During the day, forager children between the ages of three and eight are often left in camp with adult alloparents (e.g., grandparents, aunts, and uncles), whereas older children who can keep up with adults on hunts and gathering trips join their parents in the forest. Forager infants and young toddlers are carried to the forest in side-slings, with mothers and fathers often taking turns transporting their children. Prior to weaning, farmer infants and toddlers are carried in cloth wraps on their mothers’ backs to the fields daily. After weaning, farmer children are put under the care of juvenile alloparents (usually older siblings), and by the time children are four or five years of age they are often responsible for the care of their younger siblings.

Previous studies (Fouts 2002) have also demonstrated that Bofi forager toddlers are held substantially more often than Bofi farmer toddlers (43.33% and 8.17% of the day, respectively) and forager caregivers respond more quickly to toddlers who fuss or cry (foragers responded to 64% of fuss/cry episodes whereas farmers responded to fewer than 10%) (Fouts and Lamb n.d.).

#### WEANING PRACTICES

Forager parents explained that children decide to stop nursing of their own accord. As was suggested by preliminary studies (see Fouts, Hewlett, and Lamb 2001), parents were not observed prohibiting or discouraging their children from nursing. Forager parents also explained that they did not prepare special foods for weaning-aged children. Although these methods are uncommon in the ethnographic literature (for other types of weaning methods, see Ainsworth 1967, Albino and Thompson 1956, LeVine and LeVine 1966, Shostak 1976), Ivey (1993) similarly noted that Efe forager mothers never actively imposed weaning and that the children discontinued breastfeeding of their own volition.

Weaning among the foragers took place between 36 and 53 months of age. Parents did not report that children should be weaned at any specific age, although they indicated (by gesturing the size of a four-year-old) that children usually stop breastfeeding in their fourth year. As illustrated above, weaning did not occur within an encapsulated time frame (e.g., a few days or a week) but was determined by the children.

The Bofi foragers value personal autonomy and accord children respect as well. Children are allowed to make their own decisions, choosing, for example, whether to help their mothers or to play instead. Accordingly, forager parents did not direct weaning and viewed weaning

as child-led. For example, when one mother was asked, “When will nursing end for your son (four-year-old)?” she laughed and said, “Only he knows. Ask him. I cannot know how he thinks/feels.”

The farmer mothers who weaned their children during the study period used a technique that entailed painting their nipples with red fingernail polish to resemble a wound. The majority of mothers reported that they had used this method when weaning their previous children as well. Less frequently reported methods involved putting bandages over the nipples (also to simulate a wound) and allowing children to stop nursing on their own. Farmer parents felt that pretending to have injured nipples was effective because it frightened children and thus reduced their desire to nurse.

All farmer mothers reported that rice or rice gruels were prepared specially for children being weaned. Weaning among the farmers took place between 18 and 27 months of age. Farmer parents unanimously agreed that weaning was conducted at the age of two, when the teeth were fully in. Once mothers initiated weaning by covering their nipples, children were considered “being weaned” for approximately a week. Parents felt that late weaning led children to be inactive and lazy. They felt that it was important to initiate weaning by two years of age to prevent these consequences. Rice gruels were seen as an essential part of weaning, without which children might cry incessantly.

The Bofi farmer weaning technique, causing children to be afraid to continue nursing, is quite consistent with overall caregiving themes and cultural schemas.

#### The Study

The data presented here were obtained during 13 months of fieldwork between 1998 and 2001 and are part of a larger study designed to collect basic ethnographic data on the two groups, examine the social and emotional contexts of early childhood (18 to 59 months of age), especially with respect to children beginning to cease breastfeeding, and collect data on parental practices and schemas. Whereas weaning is often defined as beginning when infants are first given solid food (Martin 1984, Raphael 1984), we focus on the final phase of weaning—the actual cessation of breastfeeding—and, for the sake of brevity, use the term “weaning” to refer to this event. We are interested in the social events that accompany the end of nursing and the children’s responses to these events.

#### PROCEDURES

Focal-child observations (Altmann 1974) provided quantitative behavioral data on young children. The focal-child observation technique involved observing one child at a time, recording the behaviors and interactions of the child and caregivers with him/her. The behaviors were recorded on-the-mark, as determined by a tape recording with verbal commands to “observe” for 20 sec-

onds and then to “record” the observed behaviors on a detailed checklist for the next 10 seconds. The observe/record signals were delivered through a small earphone worn by the observer. The behaviors recorded included child visual orientation, child states, child attachment behaviors, caregiver responses to fussing and crying, child social behaviors, child nursing and feeding behaviors, caregiving behaviors, and caregiver-child physical locations. Three four-hour observation sessions were conducted for each child over two to three days, so that the sessions spanned the daylight hours (6–10 a.m., 10 a.m.–2 p.m., and 2–6 p.m.). The four-hour observation sessions were divided into four 45-minute segments, with 15-minute rest periods after each segment to prevent observer fatigue. Each child was thus observed for a total of nine hours,<sup>4</sup> or 1,080 30-second observation intervals.

Twenty-two forager children and 21 farmer children were observed. Children were selected for this study if they were between the ages of 18 and 59 months and had two living parents (the latter because we were interested in observing both maternal and paternal caregiving). Because of the small size of the population, very few children were excluded, and all the children who participated were deemed healthy by their parents. Ages were approximated using dental examinations supplemented by a relative aging scheme in which children were ranked from oldest to youngest on the basis of the perceptions of parents and relatives.

With the assistance of a farmer who translated the responses from Bofi to French, qualitative semistructured interviews were conducted with the parents in order to clarify cultural practices and schemas regarding weaning and young children. Parents were asked to describe the weaning of their most recently weaned children and to assess and interpret the children’s behavior in order to clarify their perceptions of weaning. They were also asked why they chose certain weaning techniques and what they thought about the practices of others. Mothers were asked if they were currently pregnant, and pregnant mothers were palpated and their ventral area measured to assess the approximate week of gestation.

Parents were also asked about their children’s health histories, the seasons in which their children were born, and how many seasons had passed since then. Members of the community (including the parents of focal children) were asked about family genealogy and birth and marriage histories. These demographic questions were asked in Bofi with minimal interpretive assistance.

#### BEHAVIORAL MEASURES

*Nursing status.* Because of the differences between farmers and foragers in cultural designations and practices regarding weaning, we created categories of nursing in order to compare children in the two cultures at different

weaning stages. The categorical designations were (1) high-level nursing, (2) low-level nursing, and (3) fully weaned (no longer nursing). Children with nursing levels above the median were categorized as “high-level nursers” and children with nursing levels at or below the median were categorized as “low-level nursers.” Nursing levels represent the total percentage of daylight hours children were observed nursing, and frequencies of nursing represent the average number of nursing bouts observed per hour. Bouts were defined as continuous periods of breastfeeding separated by at least one 30-second interval, similar to the “nursing episodes” described by Vitzthum (1994), which consisted of a series of nursing events (separated by no more than 5 seconds) during which the nipple was in an infant’s mouth.

*Weanling emotions.* After retrospectively interviewing Zulu mothers about their children’s weaning experiences, Albino and Thompson (1956) independently concluded that crying, aggression, and negativism (refusal to respond to a caregiver) were indications of weanling distress, which might also involve temper tantrums (Daly and Wilson 1988, Trivers 1974). We originally examined crying, aggression, and negativism in an attempt to quantify children’s resistance. However, crying occurred much more frequently than aggression and negativism in both groups and therefore appeared to be a better measure of emotional resistance. Crying was coded whenever a focal child had tears coming out of his/her eyes. Whining and whimpering without tears were coded as fussing. We examined the two types of crying together. Child fussing and crying behavior often occurred simultaneously with other behaviors, such as nursing, and the protocol we used allowed us to code multiple co-occurring behaviors.

*Maternal activities.* Both mothers’ and children’s activities were recorded, and mothers were designated as either working or at leisure. Work included any activity related to the production, collection, or preparation of food and the construction or maintenance of living areas.

*Cultural context of care.* Qualitative and quantitative techniques were used to examine parental ethnotheories, weaning techniques, and caregiving practices. Holding and responsiveness to fussing and crying are segments of broader cultural schemas and social relations. For example, patterns of alloparenting (e.g., helping others with child care) reflect patterns and schemas about sharing. Holding occurrences were tabulated to examine the caregiving transitions that parallel weaning and their effects on children’s emotional behavior. Holding was coded any time a child was held in a caregiver’s arms, lap, or carrying device (e.g., side-sling or wrap). Caregivers were categorized by age category (i.e., juvenile, adult, elderly), sex, and relationship to the focal child (e.g., father’s sister, mother’s sister’s son).

#### STATISTICS

A linear regression model with levels of fussing and crying as the dependent variable and cultural group, child’s age in months, nursing (1/0), low-level nursing (1/0), ma-

4. Two of the forager children were observed for 7.5 and 6 hours because of scheduling conflicts and the health status of one of them.

ternal pregnancy (1/0), and level of maternal work (percentage of day) as independent variables was fitted to the combined data in tables 1 and 2 to examine the associations between fussing and crying levels and the explanatory variables. Three farmer children were being overtly prohibited from nursing during observations, and this cultural weaning practice was addressed in post-hoc analyses comparing mean fussing and crying levels using Mann-Whitney nonparametric *U*-tests.

## Evaluating the Theoretical Predictions

The abrupt cessation of parental investment by way of breastfeeding is commonly thought to be the primary cause of weaning distress. The nursing patterns of Bofi farmers and foragers who breastfed at low levels and were presumably closest to the cessation of breastfeeding (i.e., preweaning) (table 3) were very similar despite the age differences.

Because farmer mothers initiated weaning on a specific day selected without warning, it initially seemed likely that nursing levels would remain fairly stable up to weaning and then end abruptly. In fact, breastfeeding gradually decreased for both farmer and forager children. This gradual decline in breastfeeding was, however, subtly implemented by farmer mothers, who made themselves less available by occasionally leaving their children at home while they worked and by distracting children with supplemental foods when they approached to nurse. Beginning when their children were around two and a half years of age, forager parents likewise attempted

to leave their children in camp on occasion when they went hunting or collecting food in the forest, although it was usually not until the third or fourth year that children began to stay in camp on a daily basis when their parents left. Forager parents were never observed interrupting nursing bouts; nursing children were given free access to the breast when their mothers were present. The gradual decline in nursing in both groups suggests that the cessation of breastfeeding does not wholly account for differences in the behavior of forager and farmer weanlings.

In the main analysis we examined factors associated with levels of fussing and crying without differentiating between cultural weaning practices because some of the cells included too few children (e.g., three farmer children were overtly prohibited from nursing). The linear regression analysis (summarized in table 4) showed that low levels of nursing and maternal pregnancy significantly predicted levels of fussing and crying; children who nursed infrequently and children with pregnant mothers exhibited higher levels of fussing and crying than other children, suggesting, as Trivers predicted, that children compete with their siblings (e.g., unborn infants) to maintain maternal investment (e.g., breastfeeding). Figure 1 shows the relationships between fussing and crying level, maternal pregnancy, and level of nursing. Three of the eight children whose mothers were pregnant were also overtly prohibited from nursing, and these children fussed and cried more than the majority of the other children whose mothers were pregnant. Thus, fussing and crying may have also been related to farmer weaning practices, but we do not know which

TABLE 1  
*Bofi Farmer Children*

Pseudonym	Sex	Estimated Age in Months	Nursing Level <sup>a</sup>	Nursing Status	Estimated Maternal Trimester	Maternal Work Level <sup>a</sup>	Fuss-Cry Level <sup>a</sup>
Eve	F	18.5	7.2	Low	—	47.4	9.7
Etti	F	18.5	13.4	Low	—	39.5	2.8
Kai	F	18.5	7.4	Low	—	51.2	3.1
Babon	M	20.0	9.8	Low	—	48.9	7.3
Tasa	F	21.0	4.0	Low	—	86.3	3.9
Kingabo	M	25.0	1.2 <sup>b</sup>	Low	3	24.5	10.3
Bobo	M	26.0	0 <sup>b</sup>	Weaned	3	47.1	6.4
Emi	F	27.0	0 <sup>b</sup>	Weaned	1	26.8	12.5
Lee	M	28.5	0	Weaned	3	88.0	2.7
Mina	M	31.5	0	Weaned	—	91.9	6.9
Wanamay	F	37.0	0	Weaned	—	64.9	1.3
Eyam	F	37.0	0	Weaned	—	61.6	1.3
Zoe	M	37.0	0	Weaned	—	69.4	1.9
Bilo	F	39.5	0	Weaned	—	26.8	5.4
Mokobi	F	41.5	0	Weaned	—	74.0	1.3
Roma	M	44.5	0	Weaned	—	55.6	1.0
Beni	F	48.0	0	Weaned	—	50.9	1.0
Gali	M	48.0	0	Weaned	—	69.8	0.2
Zuno	M	52.5	0	Weaned	—	87.8	3.1
Olivia	F	53.0	0	Weaned	—	100.0	0.5
Kris	M	55.0	0	Weaned	—	84.81	0.0

<sup>a</sup>Average percentage of daylight hours.

<sup>b</sup>Mother overtly prohibited child from nursing.

TABLE 2  
*Bofi Forager Children*

Pseudonym	Sex	Estimated Age in Months	Nursing Level <sup>a</sup>	Nursing Status	Estimated Maternal Trimester	Maternal Work Level <sup>a</sup>	Fuss-Cry Level <sup>a</sup>
Bara	F	18.5	18.0	High	—	1.8	5.7
Boko	F	18.5	19.9	High	—	12.5	3.0
Gakodi	M	18.5	18.7	High	—	10.9	3.9
Bolee	M	21.0	34.1	High	—	9.9	4.4
Sombo	F	21.0	22.5	High	—	4.6	3.2
Goti	F	24.5	28.5	High	—	12.7	6.6
Yeko	M	24.5	12.8	Low	—	36.9	6.4
Nassa	M	26.0	15.6	High	—	1.1	3.6
Dee	M	26.0	4.4	Low	—	64.7	5.8
Gasi	M	27.5	27.5	High	—	33.7	1.3
Zokon	F	37.0	11.2	Low	1	50.3	5.4
Yokopi	F	37.0	0	Weaned	1	36.8	2.6
Yena	F	37.0	7.7	Low	—	49.0	1.1
Zie	M	39.5	0	Weaned	3	51.8	9.6
Zonbo	M	44.0	2.0	Low	—	41.1	14.1
Kosi	F	45.0	0	Weaned	—	43.3	6.5
Yala	F	49.0	17.1	High	—	46.1	4.1
Lyn	F	49.0	0	Weaned	—	56.7	0.4
Kanga	M	53.5	0	Weaned	—	45.8	2.1
Kogu	M	53.5	0	Weaned	—	72.0	5.1
Fetigo	F	57.0	0	Weaned	3	38.2	1.3
Kal	M	58.0	0	Weaned	—	72.8	11.8

<sup>a</sup>Average percentage of daylight hours.

condition (pregnancy or the overt maternal resistance to nursing) was more influential. Table 5 shows differences in levels of fussing and crying among children experiencing different cultural weaning practices, along with levels of cultural practices such as caregiving and working. Post-hoc descriptive analyses of the fussing and crying levels indicated that farmer children who were overtly prohibited from nursing fussed and cried significantly more than all other forager (Mann-Whitney  $U = 57.5$ ,  $p = .04$ ) and farmer (Mann-Whitney  $U = 51.0$ ,  $p = .01$ ) children, suggesting that cultural practices may have exacerbated expressions of distress by the farmer children. These behavioral data are consistent with data gathered by interviewing farmer parents, 71% of whom reported that their most recently weaned children cried frequently in response to weaning. Of the children who were reported to cry frequently, 40% were also reportedly frightened when they saw their mothers' covered nipples. The mother of one child, for example, reported that when her child first saw the red nail polish on her nipples, "he was afraid; he thought it was blood, and he cried. He cried so much [!] and wanted/needed all things, food, clothes, everything. He cried this way for a week."

Interestingly, age was not significantly associated with levels of fussing and crying in the regression analysis. Age may, however, have some impact on the amount of fussing and crying during weaning (see Bateson 1994), because farmer children were weaned younger than forager children and fussed and cried more during weaning.

Forager children with low levels of nursing had somewhat elevated levels of fussing and crying compared with other forager children, although this difference was not

significant. In a previous examination of intracultural variability in fussing and crying levels among these foragers, we concluded that individual circumstances such as maternal sensitivity, maternal pregnancy, and the quality of alloparental care explained fussing and crying patterns better than nursing levels or age differences (Fouts and Lamb n.d.). Likewise, forager parents reported no notable changes in the behavior of children when they stopped nursing (Fouts 2004).

Levels of maternal work were higher in later stages of weaning and after weaning among both farmers and foragers (see table 5), although maternal work was not correlated with levels of fussing and crying. Farmer parents explained that the timing of weaning was important because it enabled mothers to leave their youngest children at home and thus farm more productively. Several mothers described how tired they were before weaning because they had to carry their children to the fields every day. Weaning relieved them of this burden. Forager parents did not, however, describe associations between maternal work levels and weaning. Nursing is obviously costly, and thus its cessation should facilitate maternal work, as it does among Datoga pastoralists (Sellen 2001), but this pattern is not clear among the foragers. Although forager mothers of high- and low-level nursing children worked strikingly different amounts of time (Mann-Whitney  $U = 43.0$ ,  $p = .004$ ), forager mothers of low-level nursing and weaned children worked for similar amounts of time. The farmer pattern is quite clear, however; mothers worked substantially more after children were fully weaned (Mann-Whitney  $U = 88.5$ ,  $p = .01$ ). This suggests that weaning may have been hastened be-



cause farmer women provide the majority of calories (through farm work and trade) for their families, whereas the extensive sharing patterns among the foragers ensure that this burden is not placed on specific individuals.

Caregiving transitions also accompanied the weaning process (see table 5) and may have contributed to the distinct levels of fussing and crying among weanlings. Although there are many ways to view caregiving, we focus on holding because it represents an energetically costly form of investment and is a physically intimate type of caregiving like nursing. Even though the patterns of holding experienced by both the farmer and forager children changed through the weaning process, the trends in the two groups differed considerably. Overall holding decreased in both groups, but fully weaned forager children were still held for substantial amounts of time (nearly 30% of the day), even more than farmer children who were still nursing. Although maternal holding decreased in both groups through the weaning process, this decrease was compensated for among the foragers by high levels of holding by other individuals such as fathers, grandmothers, and aunts. The lack of marked weaning distress among forager children may therefore reflect the gradual changes in caregiving that accompanied weaning and the increased involvement by other adults, as well as the use of subtle weaning practices. Farmer children were rarely held by anyone once they were fully weaned. For farmer children, therefore, weaning involved not only the abrupt cessation of nursing but also the cessation of a prominent form of intimate physical care. Indeed, many newly weaned three- and four-year-olds were required to provide care for their younger siblings.

### Why Resist Weaning?

Trivers assumed that children resist weaning because it represents a decline in maternal investment, whereas Bateson suggested that nursing is less important to older than to younger children. Bof farmer children are weaned earlier than forager children, and this may partly explain why they exhibited marked distress. Nursing gradually declined for forager children, and the actual cessation involved a very small decrease in physiological investment because these children were already primarily nourished by solid food. Interestingly, a similar pattern characterized weaning among the farmers, although

TABLE 4  
*Summary of Linear Regression Analysis for Variables Predicting Children's Levels of Fussing and Crying (n = 42)*

Variable	Unstandardized Coefficients		Standardized Coefficients		
	<i>B</i>	<i>SE B</i>	$\beta$	<i>t</i>	<i>P</i>
Cultural group <sup>a</sup>	1.47	1.49	0.21	0.98	N.S.
Age <sup>b</sup>	-0.02	0.07	-0.06	-0.24	N.S.
Nursing <sup>c</sup>	-1.68	2.16	-0.24	-0.78	N.S.
Low level of nursing <sup>d</sup>	3.38	1.57	0.42	2.15	0.04
Maternal pregnancy <sup>e</sup>	3.28	1.65	0.33	2	0.05
Maternal work <sup>f</sup>	-0.03	0.03	-0.21	-0.96	N.S.

<sup>a</sup>1, farmer; 2, forager.

<sup>b</sup>In months.

<sup>c</sup>1, nursing; 0, weaned.

<sup>d</sup>1, Low levels of nursing; 0, all other nursing statuses.

<sup>e</sup>1, mother pregnant; 0, mother not pregnant.

<sup>f</sup>Percentage of total intervals mother was observed working.

their children were younger than forager children when nursing ended completely.

Konner (1977) argued that weanlings should exhibit distress in order to elicit further parental investment in competition with their younger unborn siblings but went on to explain how children overcome this competition and begin to "desire" younger siblings because their siblings possess replicas of their genes and thus promote the weanlings' inclusive fitness. Sibling-sibling competition was apparent in our analyses of the weaning process, as maternal pregnancy was significantly predictive of elevated levels of fussing and crying. Maternal pregnancy was also predictably associated with aspects of the weaning process in both groups. The majority of farmer mothers reported that they were not pregnant when nursing ended, but overt maternal resistance to nursing was observed only among pregnant mothers. By contrast, most forager mothers stated that they were pregnant when nursing ceased.

Differences in interbirth intervals and age at weaning between farmers and foragers are consistent with the idea that interbirth intervals decreased during the prehistoric

TABLE 3  
*Nursing Patterns of Low-Level Nursing Children*

	Age in Months	Nursing Level <sup>a</sup>	Length of Nursing Bouts (minutes)	Frequency of Nursing Bouts (per hour)
Farmer (n = 5)	19.30 (1.15)	8.37 (3.51)	1.89 (.31)	2.82 (1.45)
Forager (n = 5)	33.70 (8.24)	7.61 (4.51)	2.88 (.70)	2.22 (1.07)

NOTE: Standard deviations are in parentheses.

<sup>a</sup>Average percentage of daylight hours.

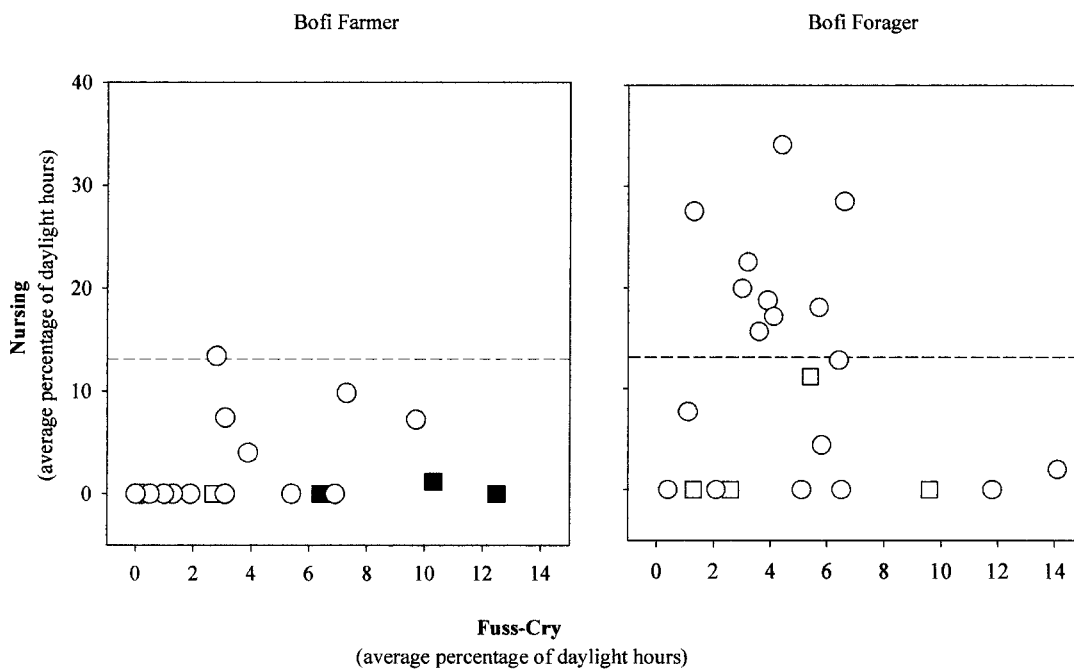


FIG. 1. *Nursing and fussing-crying.* White squares, *mother is pregnant*; black squares, *mother is pregnant and overtly prohibiting child from nursing*; dotted line, *median split for nursing children.*

transition from hunting and gathering to farming and animal husbandry (Ellison 2001, Lancaster and Lancaster 1987), although the farmers do not have higher fertility rates than the foragers. Lower interbirth intervals are believed to reflect the availability of calorie-dense weaning foods, which are easier for young children to eat and ensure that they are adequately nourished without nursing (Ellison 2001). Sellen and Smay (2001), however, reject this hypothesis on the basis of a survey of 133 cultural groups reported in the Human Relations Area Files (HRAF). They report that variation in weaning age is not related to the availability of weaning foods; foraging populations also have weaning foods available and actually begin giving supplemental food to infants earlier than do food-producing groups. Instead they propose that age at weaning is affected by factors such as maternal work, which often takes mothers away from children, and pathogen risk to children. Both Bofi farmer and forager mothers leave their home area for subsistence work, but farmers begin to leave their children at home earlier than foragers. Farmer mothers frequently mentioned that the strain of working while carrying children influenced their decision to wean (Fouts 2004), and they worked longer hours than forager mothers at all weaning stages. Bofi forager and farmer patterns are consistent with Sellen and Smay's hypothesis.

Reflecting their cultural schemas and patterns of social relations, the weaning techniques of Bofi farmer and forager parents were quite distinct. For example, the fear-invoking technique observed among the farmers may help account for the strikingly high levels of fussing and crying during weaning, whereas the child-led pattern of weaning

among the foragers may help explain the lack of weaning distress. Weaning practices and beliefs reflect general differences in fundamental schemas and social relations. They are transmitted nonbiologically (i.e., culturally) from generation to generation and tend to be highly conserved (Hewlett, de Silvestri, and Guglielmino 2002). They persist regardless of language spoken (both groups speak the same language) or ecology (both groups live in the tropical forest and are exposed to similar infectious and parasitic diseases). Like other forager groups such as the Aka (Hewlett et al. 2000), Bofi foragers emphasize autonomy, trust, and giving, holding children more often and responding more quickly to fussing or crying children. Bofi farmers emphasize deference and respect toward elders and males, hold children less, are less responsive to fussing and crying, and use fear-invoking techniques to develop these desired qualities. These cultural schemas and practices are consistent with patterns of sharing and views of the environment that may characterize hunting-and-gathering as opposed to food-producing cultures (Bird-David 1990). Furthermore, Hewlett et al. (2000) found that views of the environment, others, and the self are linked to parenting practices among Aka foragers, Ngandu farmers, and Euro-American urban-industrialists.

The caregiving contexts of weaning were very different among the Bofi foragers and farmers. Maternal-infant relationships have often been emphasized in the child development literature (Thompson 1998), and parent-offspring weaning conflicts have typically been viewed as mother-offspring conflicts (Babbitt and Packard 1990, Bateson 1994, Cassinello 1997, Lefebvre 1985, Malm and

TABLE 5  
*Cultural Practices (Average Percentage of Daylight Hours) and Weaning*

	Fussing and Crying	Maternal Work	Maternal Holding	Nonmaternal Holding	Total Holding
Bofi forager children					
High-level nursing ( <i>n</i> = 9)	3.98 (1.54)	14.82 (15.19)	50.31 (14.04)	3.96 (2.83)	54.59 (14.11)
Low-level nursing ( <i>n</i> = 5)	6.56 (4.71)	48.39 (10.69)	27.16 (8.44)	19.24 (10.59)	46.38 (6.96)
Fully weaned ( <i>n</i> = 8)	4.93 (4.12)	52.18 (14.09)	13.11 (15.03)	16.00 (15.98)	29.24 (19.79)
Bofi forager children					
Low-level nursing, no OMR <sup>a</sup> ( <i>n</i> = 5)	5.36 (3.02)	54.67 (18.22)	17.46 (17.64)	2.44 (3.03)	23.82 (17.32)
Low-level nursing, OMR <sup>a</sup> ( <i>n</i> = 3)	9.73 (3.09)	32.81 (12.45)	5.43 (5.83)	10.53 (7.07)	21.87 (13.10)
Fully weaned, ( <i>n</i> = 13)	2.05 (2.05)	71.19 (19.95)	1.04 (2.39)	0.82 (2.79)	3.38 (6.50)

NOTE: Figures in parentheses are standard deviations.  
<sup>a</sup>Overt maternal resistance to nursing.

Jensen 1997, McDade 2001). As Daly and Wilson explained, "Young human beings are extremely dependent upon the benevolent attention of adult caretakers for a very long time; for the most part, that has meant and continues to mean their mothers" (1988:115). Mothers obviously play a major role in weaning, but, when discussing toddler-aged children who are no longer physiologically dependent on breastfeeding, we must also examine parallel changes in other types of caregiving. Because breastfeeding typically involves close contact and holding, levels of holding declined in both groups as weaning took place. Holding is not a mother-specific behavior, however, because other caregivers also hold children effectively. Patterns of nonmaternal care were very different in farmers and foragers. Prior to and during weaning, farmer children were primarily cared for by their mothers and female juveniles; after weaning they received little care from anyone and were often expected to care for younger siblings. For these children, weaning involved drastic decreases in many types of investment, and they may have been reacting to these changes in patterns of care rather than simply the nutritional transition.

Forager children continued to receive significant levels of adult care throughout the weaning process, even though maternal care declined. Nonmaternal caregivers played important roles by providing intimate care (e.g., holding) during and after weaning, making the decrease in investment proportionally smaller for forager children than for farmer children. When these types of investment are considered, the forager children's lower distress levels are also consistent with parent-offspring conflict theory; these children simply may not experience a significant enough decrease in investment to elicit such pronounced resistance. This is also consistent with Altmann's (1980) hypothesis that extreme responses to weaning such as temper tantrums can be more costly than beneficial to weaning children. For example, children who throw temper tantrums or are highly distressed may miss opportunities for important social activities, including feeding. Furthermore, Altmann noted that the best strategy may

sometimes be compromise and cooperation. Because the overall cost of weaning appears to be less for forager children than for farmer children, it may simply not be necessary for forager children to expend energy on overt and costly reactions. In addition, it is possible that the timing of weaning may be optimal for both mothers and offspring among the foragers and therefore does not prompt behavioral conflict.

In summary, we have used qualitative and quantitative behavioral, demographic, and ethnographic data to illustrate how weaning is embedded in cultural and reproductive contexts. Because a complex web of factors undoubtedly influences human behavior, it is clearly useful to consider the many contexts that influence humans rather than to explore only a biological or a cultural explanation. Culture and biology interact to produce the observed cessation of nursing patterns among Bofi foragers and farmers. The maximization of reproductive fitness in a particular ecology certainly influences observed differences and shapes caregiving. Many researchers have indicated that particular rearing environments affect the reproductive strategies of individuals (Belsky 1997, Chisholm 1996, Draper and Harpending 1987), but it is also clear that the observed differences in children's responses to weaning cannot be explained without understanding the broader cultural schemas and social relationships.

## Comments

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I welcome this attempt to bridge the gap between culture and biology, which is itself symptomatic of a dominant mode in modern Western thought (although by no means

the only mode; see Ingold 2000). All the same, despite the everyday language they share, there *are* deep cultural differences between cultural anthropologists and biological and evolutionary anthropologists, differences that may be as sharp as those between the Bofi farmers and Bofi foragers. Anthropologists of culture, biology, and evolution share an ecology, a language, and an everyday social life but have their own cultural schemas and approaches. While as a cultural anthropologist I may argue that Fouts, Hewlett, and Lamb only skim the surface of my discipline, such an argument would miss the valuable contribution of their paper. Indeed, it would ignore the fact that bridging is about going *over*, not *into*, deep waters. Instead, I will address what the paper designates as “culture” from a dialogical rather than a critical point of view, with an eye to finding a middle ground between our disciplines.

The paper makes an important contribution, first, by highlighting “weaning” as a subject for study in its own right, not just as a footnote in the study of breast-feeding and, more generally, infant feeding. Secondly, it recognizes that weaning is not just an issue for nutritionists, biologists, ecologists, and evolutionists but a “total social fact,” reflecting and shaping perceptions of self, other, relations, and community and providing a mirror for notions and relations of power and coercion.

I cannot agree more with Fouts, Hewlett, and Lamb that viewing children as active agents (with Trivers) is important but is not enough. It is vital to take the broader “context” into account, however simply the “context” is defined for methodological reasons. They single out the Bofi foragers’ egalitarian ethos, their respect for individual autonomy, and the extensive practice of sharing, in contrast with the Bofi farmers’ clan politics and hierarchy. My work experience with a semiforaging community living in forested areas in South India supports their thesis. The Nayaka with whom I worked generally resemble the Bofi foragers in their attitude toward weaning babies. They allowed the babies to make their own decisions regarding weaning, thereby allowing for a gradual weaning process. Generally, mothers who threatened or just admonished their young children, even when the children were annoying them or disrupting activities, would be reproved by bystanders. Nayaka believed that babies had little *budi* (social sense); they did not know yet how to behave and had to be given the time to find out for themselves. Notably, the attitude toward toilet training was much the same. One of my vivid memories is of a father carrying a baby who began to urinate. Without any fuss, he continued to hold the baby but just held him a bit farther away from his own body for the duration. Besides being indicative of values of equality, autonomy, and sharing, the attitude toward weaning could also be related to the value of diversity. Among such peoples as the Nayaka and, I would expect, the Bofi foragers, being the *same* is far less important than sharing with one another. Generally, comparisons between individuals and competition are limited (see Gardner 1966), and there is no pressure to conform to a preset model such as an age for weaning.

I am concerned about two methodological issues in the study. First, the use of a Bofi farmer man as the translator for the qualitative semistructured interviews conducted with parents raises some problems. Would not the translator’s own “cultural schema” as a Bofi farmer have interfered with the interviews with the Bofi foragers? A possible way around this problem would be to approach the interview not just as a “tool” for eliciting information but also as a revealing experience in itself. I would like to hear whether during the interviews the researchers experienced difficulties and misunderstandings that might tell us something about the cultural gaps between the interviewer, the translator, and the interviewees. My second concern lies with statistical manipulations of data concerning very small populations. Given field conditions and the fluidity and the spread of the study group, having observed 43 children is an impressive achievement. However, the question arises whether these are enough cases for statistical analysis and statistical generalizations. This is a general problem in the study of foraging societies, one of whose defining characteristics is very small scale.

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The evolution of cooperation and conflict between more or less mutually dependent parties is one of the most fascinating topics in biology. In humans, parent-offspring interactions pervade the life history from placentation (Haig 1993) to motherhood (Hrdy 1999) and grandmothering (Lahdenpera et al. 2004) and provide a spacious arena for analysis of how and when conflicts occur and how they are resolved.

Parent-offspring conflict is difficult to study in humans because the optimal situation for each must be specified for any given context, myriad alternative strategies may be available to achieve one’s optimum, and the inclusive-fitness costs and benefits of the behaviors are challenging to measure. Fouts et al. have used one of the potentially most powerful tools of natural science, the comparative method, in seeking to overcome these problems. Like many pioneering comparative studies before them, theirs falls into an epistemological and statistical pit that precludes or at least delays broad insights into parent-offspring conflict in humans.

The difficulty here derives from the comparison of only two cultures, albeit closely related ones. Like any two species, two cultures are expected a priori to differ in a wide range of traits (Garland and Adolph 1994). For any pair of traits A and B, the odds are high that simply by chance the cultures will covary—A<sub>1</sub> and B<sub>1</sub> in one culture, A<sub>2</sub> and B<sub>2</sub> in the other. Such comparisons involve no degrees of statistical freedom (Garland and Adolph 1994). Moreover, the states of additional traits may also vary between cultures, and these traits may cause or confound covariation between A and B. Is earlier

weaning a cause of greater conflict? Do other of Fouts et al.'s inferences hold? Perhaps. The covariation patterns aim in directions predicted by theory, and other forms of data on functional links between the traits are persuasive. Indeed, this study presages a comprehensive approach to the analysis of human behavioral and life-history traits in its dovetailing of anthropological and behavioral-ecological perspectives.

How to escape the pit? The only justifiable way to extract statistical signals from cultural differences such as these is to treat each of Fouts et al.'s results as a single datum and find additional pairs of closely related cultures for which the relevant traits have evolved or otherwise changed independently. With enough such pairs, random and confounding differences should vary and cancel each other out, allowing the behavioral, ecological, genetic, and cultural causes of stronger or weaker weaning conflict to rise above diverse cultural noises. Mace and Pagel (1994) advocate this method of identifying independent events of correlated cultural change to make comparative analyses statistically valid. The harnessing of such methodological power has lagged, apparently because of the difficulty of weaning comparative biologists from considering humans as problematic for rigorous evolutionary-ecological study and weaning anthropologists from nonphylogenetic perspectives for the analysis of diversity. As in cultures other than science, progression beyond the soporific comfort of one's usual mother's milk need not require whining and fussing if all parties agree that the time is right.

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This is a welcome ethnographic addition to the far-too-scanty anthropological literature on early childhood; it is equally significant theoretically. Cultural values are rarely considered in discussions of infancy; Fouts, Hewlett, and Lamb powerfully demonstrate the difference that culture makes in infant feeding experiences. In viewing weaning as not just a biological activity but also a social one, they contribute to a small but growing corpus exploring the social construction of babyhood (for a review, see Gottlieb 2004:38–61). Thus this article offers an important corrective to the literature on weaning informed by reductionistic theories such as the parent-offspring-conflict model that the authors effectively critique. Contra the 2,000 English-language parenting books (see DeLoache and Gottlieb 2000), childhood is not a “natural” experience ruled by a universal “common sense.” It is strikingly variable cross-culturally; indeed, as this article illustrates, it even varies between two closely related, neighboring groups speaking the same language.

In consonance with its cultural emphasis, the article appropriately privileges local models of childhood (see Harkness and Super 1996). It also refreshingly considers child care by fathers and other relatives. Here the authors

follow Weisner and Gallimore (1977) and more recent work (e.g., Bentley and Mace n.d.) that studies siblings and others as caretakers (e.g., Gottlieb 2004:136–64) and sleep companions (Caudill and Plath 1966, Shweder, Jensen, and Goldstein 1995).

Although Fouts et al. mention fathers, they are short on specifics. It is not always clear whether in discussing “parents” they really mean both mothers and fathers. Both Hewlett and Lamb are leaders in scholarly research on fathers' roles in children's lives (e.g., Hewlett 1991b, 1992; Lamb, 1987, 1997); their previous work could have been more of a beacon here.

Likewise, one misses hearing Bofi voices. Narratives of Bofi farmers' and foragers' perspectives on and experiences with weaning would have greatly enriched the article. The authors indicate that they spoke in the Bofi language for simple interview questions but relied on translators for more nuanced conversations. Considering the intimate nature of the topic, one wonders what was left unsaid—or untranslated—by informants and their translators.

A firmer focus on informants' perspectives might have also led the authors to consider local theories of breast-feeding in symbolic context. Other writers have explored how both breasts and breast milk are conceived in a variety of cultural settings (e.g., Dettwyler 1995a; Gottlieb 2004:185–219; Gunnlaugsson and Einarsóttir 1993; Maher 1992; Perry 1991). In many non-Western societies, for example, breast milk and semen are viewed as antithetical, producing a postpartum sex taboo until weaning—although some contemporary groups now allow sex during breast-feeding as long as condoms are used (Hull 1985). A monogamously married man may urge his wife to wean early, and women may feel themselves caught between husband (who urges weaning) and toddler (who urges breast-feeding)—although a polygynously married man may be less adamant (e.g. Gottlieb 2004:213–14). Elsewhere, a bottle-feeding mother may overdilute formula to thin it and make it “safe,” as breast milk is considered too “hot” (Cosminsky 1985).

Broader considerations of history might also have been treated. Dettwyler (1995b) has proposed that the “hominid blueprint” for weaning is perhaps as long as five to six years, while weaning age is on the decline in many places (e.g., Harkness and Super 1987, Raphael and Davis 1985). The fact that Bofi hunter-gatherer toddlers wean themselves later than Bofi farmers wean their children may support Dettwyler's proposal. It would be intriguing to see Fouts et al. engage with Dettwyler's provocative proposition.

Another historical question concerns technology. What weaning methods were used before bandages and nail polish became available to the Bofi? Did previous methods similarly frighten nursing toddlers, or has the emotional tone of weaning changed with new weaning substances? A historical look at breast-feeding over the past century in both groups would be helpful (cf. Hunt 1997). With regard to contemporary weaning technologies, any medical effects on the mother from the troubling use of bandages and nail polish might also have been investigated.

Finally, the procrustean parent-offspring-conflict model,

which privileges “parental investment,” the amorphous “fitness,” and the related “reproductive success” *über alles*, excludes far more of interest than it includes; the data in this fine study are far richer than what this model can accommodate. Rather than attempting CPR on a theoretical model inspired by the long-defunct sociobiology (cf. Sahlins 1976), Fouts, Hewlett, and Lamb would do better to explore the nuances of their data through a potentially more fruitful theoretical lens.

Despite these shortcomings, the article clearly draws on abundant data. In future writings from their fertile fieldwork, the authors may fill in some of the above-noted gaps. Theirs is a well-conceived project, and one looks forward to further analyses.

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I applaud this paper for offering a theoretical and analytical context for what every mother knows: cessation of nursing can be a difficult time for both mother and child. It is true that parent-offspring-conflict theory (not very surprisingly) predicts the use of tantrums and other toddler psychological weapons to maintain parental investment upon weaning. However, the authors of this paper have not adequately addressed what I see as the central issue they raise in their attempt to help us understand why the transition to solid-food diets appears to be less traumatic for children and mothers in some societies. Additionally, they make less progress than promised in furthering our understanding of the links between biology and culture and their impact on individual behavior.

In my estimation, allo-care patterns are the critical piece of this picture. Fouts et al. state, “When [other types of nonmaternal caretaking are] considered, the forager children’s lower distress levels are also consistent with parent-offspring conflict theory; these children simply may not experience a significant enough decrease in investment to elicit such pronounced resistance.” This seems obvious. However, the theoretical connection between parent-offspring conflict theory and allo-care needs additional elaboration. How exactly does allo-care fit into the theoretical framework, precisely what predictions does the theory make about allo-care, and how do Bofi farmers and foragers illustrate those predictions?

Among the agro-pastoral ethnic Tibetans of northern Humla, Nepal, with whom I have worked since 1995, mothers handle weaning using a strategy that combines Bofi farmer and Bofi forager weaning strategies and parental care patterns. Their approach to this potentially difficult period appears to mitigate mother-child conflict over the cessation of nursing very effectively. This is true despite the fact that Humli Tibetan children typically stop nursing close to the relatively young age of 2 (even though Bateson [1994], as pointed out by Fouts et al., predicts more conflict at younger weaning ages). Of 88 mothers interviewed about fertility and breast-feeding,

the average duration of breast-feeding was 2.3 years. The average interbirth interval for these women was roughly a year longer than the duration of breast-feeding, so mothers typically wean children well before a new pregnancy starts. Thus the duration of breast-feeding among Humli Tibetans is very similar to that among Bofi farmers. Also like Bofi farmers, Humli Tibetans then prefer to end that period abruptly by sending weanlings to the yak camps, at some distance from their mothers, where they will reside with a grandmother or other kin for a three-to five-month period.

Why the absence of conflict, since weaning occurs abruptly and to relatively young children? The climate is cooler and hygiene is thought to be better for children in the camps than in the warmer villages, and dairy products to supplement the diet of the youngster are available in abundance. More important, sending the weanling to the yak camp physically separates mother and child and can precipitate a temporary transferral of the child’s affections from the mother to the caretaker. This transferral is in fact a natural one. As do Bofi foragers, Humli Tibetans rely heavily upon allo-caretakers, especially grandparents, from infancy onward. Grandparents and other kin spend hours with babies both at home and in the yak camps, and young children are held and cuddled by them almost constantly when their parents are unavailable. This caretaking pattern appears to play an important role in easing the transition from nursing to a full-time diet of solids.

My reading of the Bofi farmer versus forager strategies suggests that the crux of the argument presented by Fouts et al. is not the interaction of biology and culture per se but the relative importance of allo-care in child-rearing strategies. The extent to which allo-caretakers play a role in child rearing may have some connection to subsistence or other behaviors impacted by biology (e.g., the Bofi forager emphasis on sharing versus Bofi farmer emphasis on deference to male authority and scare tactics required to bring that deference about), as they suggest, but in fact this hypothesis remains untested. In addition to the quantitative data they present, this paper needs deeper ethnographic evidence of the putative cultural schemas separating farmer and forager child-rearing strategies to justify the connections implied between biology and culture.

This paper takes an important step toward describing and analyzing the variation in children’s responses to their mothers’ weaning strategies, but it is just a first step. Given the small sample sizes in these analyses, the number of societies considered, and the breadth of the conclusions drawn, I think it would benefit Fouts et al. to convene a group of anthropologists working on similar issues across socioeconomic contexts. Then they can do the analysis that will be required for their conclusions to convince anthropologists (and other scholars) of the importance of biology and its impact on culture for behaviors associated with breast-feeding and weaning.

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Fouts, Hewlett, and Lamb's paper draws together important currents in anthropological thought and research. In addition to the implications the authors point out for parent-offspring conflict theory, the paper draws attention to a reemergence of interest in the role of the child as an active participant in the context not only of parent-child relations but also of the larger environmental context. This study is a major move forward to a more sophisticated consideration of the complexity of cultural, biological, and environmental considerations in explaining not just parental practices but also child behaviors. The differences between Bofi foragers and farmers also recall Edgerton's (1971) *The Individual in Cultural Adaptation: A Study of Four East African Peoples*, which sought to explain psychological differences among four tribal groups arising both from culture and from subsistence strategies of farming versus pastoralism in each group.

Those who use the cross-cultural record to explain parent-child conflict, including its extreme form of child maltreatment, have long speculated on the conflict that child-rearing patterns may precipitate. This conflict has included the possibility that children's distressed responses to regular parental practices such as weaning may precipitate parental anger. Instead, the argument and analyses in the current paper offer a complex and nuanced approach that includes parental child-care behaviors tied to differences in subsistence patterns that mesh with cultural responses including multiple caregivers and responsiveness to crying—all of this in the context of reproductive strategies. Interesting cultural questions remain, though, as to why, for example, the Bofi farmers elect fear rather than another aversive strategy.

The paper also has implications for an emerging interest in child agency that is central to an approach termed childhood studies, which is more developed in European anthropology and sociology than in the United States. This approach has emerged, in part, in response to the UN Convention on the Rights of the Child, which stresses the "three p's": protection of children, provision of children's needs, and children's participation in social and cultural life, particularly in decisions affecting them. This work has been primarily sociocultural in nature. This paper reminds us that the view of children as active agents rather than passive participants also has a long history in evolutionary theorizing.

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The debate about parent-offspring conflict has been sporadic and largely theoretical rather than evidence-based.

There appear to be several reasons that the theory has remained largely untested among humans. First, although there are hundreds of "ethnographic" descriptions of breast-feeding and weaning practices, the majority are of limited usefulness in cross-cultural analysis (Sellen 2001b). Most such reports are based on qualitative data that were unsystematically collected over short time periods on small samples using nonstandardized and indirect procedures. Their authors often fail to triangulate observations and informant reports collected using different techniques such as participant observation and longitudinal follow-up by interview. Second, few ethnographies focus on infant and young-child feeding (van Esterik 2002), and so there is little exemplary work to stimulate students. Third, few academic anthropologists study children at all (Sawyer 2002, Hirschfeld 2002). The social agency of small children has been of small interest to cultural anthropologists (Briggs 1998), and the importance of the young child's diet has yet to be robustly incorporated into the research agenda of biological anthropologists. Most significant, however, the notion of parent-offspring conflict has become received wisdom among many students of human behavioural ecology, and few have been motivated to confront the formidable challenge of designing studies to test Trivers's slippery concept.

Fouts and colleagues have commendably stepped into this near-vacuum with a series of recent reports on the collection of empirical data using "mixed methods" (i.e., quantitative and qualitative) in populations involved in different subsistence activities. This allows them to measure associations between parental behaviour and exegesis and contrast the results across cultural and economic contexts. The present study focuses specifically on weaning and more generally on child socialization and has a number of strengths, including the development of new measurement constructs and coding procedures, good analytic control for multiple potential influences (particularly child age), and a discussion that places the findings within the existing anthropological and child development literature. The key finding that Bofi farmer children fuss and cry more and are weaned earlier and more abruptly than Bofi forager children suggests that ecology and culture are important influences on whether overt parent-offspring conflict over weaning occurs.

Discovery of an inverse relationship between levels of nursing and maternal time allocation to work in both Bofi groups corroborates the findings of early cross-cultural analyses (Nerlove 1974) and concords with recent studies among subsistence populations in Nepal, Tanzania, Mali, and Bolivia. A major contribution here is the presentation of data suggesting that while maternal work is a key factor influencing weaning patterns in all subsistence societies, it becomes more important in farming populations, where women tend to work more hours and the distance of fields from living sites and the nature of the work increase the somatic, energetic, and opportunity costs of carrying and nursing babies. This lends support to what we have dubbed the maternal-work hy-

pothesis—that earlier weaning and shorter birth intervals are more strongly associated with differences in the organization of women’s work in subsistence-level societies than with differences in the availability of weaning foods (Sellen and Smay 2001). These new data showing lower amounts of nonmaternal holding among Bofi farmers, especially for weaned children, are also consistent with the hypothesis that productive subsistence (farming and pastoralism) reduces the availability of allo-caregivers more sharply than extractive subsistence.

The study has some obvious weaknesses, such as small sample size and untested construct validity, but it is a pioneering attempt to test a central concept in human behavioural ecology and allows us to begin developing an agenda for further research on the evolution of variation in child feeding and care. The analysis is more successful in quantifying the opportunity costs of lactation for mothers than in quantifying the physiological costs of weaning for children. For example, the authors suggest that one reason for the apparent absence of indicators of behavioural weaning conflict among the foragers is that the timing of weaning is “optimal.” It would be interesting in future work to test this hypothesis directly by comparing assessments of infection and growth of farmer and forager children by age and breast-feeding status.

Can we develop a protocol for measuring the complex trade-offs involved in the timing of the transition from exclusive breast-feeding to consumption of family foods? Linking qualitative descriptions of caregiver practice and motivations with the standard indicators of child feeding and caregiving now available in the health science literature would make it possible to compare studies by different field teams, control for age- and sex-related variation using reference data, and estimate fitness costs and benefits using clinical proxies. It would also be helpful to include measures of the timing of introduction, nutritional quality, and pathogen levels of non-breast-milk substances as predictors of conflict behavior. Complementary feeding is uniquely evolved in humans and could arguably have reduced or increased the potential for parent-offspring conflict.

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Fouts, Hewlett, and Lamb’s article is notable for at least three contributions to the study of weaning and to the broader domains of anthropology.

First, in looking at the weaning process it takes into serious consideration the role of caretakers other than mothers; this is remarkable in that research in this area has focused, in the main, on mother-child dyadic relationships. Their paper demonstrates that among Bofi foragers a decrease in maternal holding with the age of the child is compensated for by high levels of holding by nonmaternal individuals, whereas among Bofi farmers

fully weaned children are rarely held by anyone (in fact, they are expected to care for younger siblings). These researchers have shown elsewhere that in several African foraging groups nonmaternal individuals, such as fathers, grandmothers, and aunts, play key roles in child caregiving (Hewlett 1991*b*, 1992; Fouts, Hewlett, and Lamb 2001). These findings cannot be overemphasized when we consider the impact of reports on the strong mother-child bond among various African foragers, particularly among groups of San (Konner 1977, Konner and Worthman 1980, Takada n.d.), although it would be fair to mention that, even among the Aka foragers, whose fathers do more child caregiving than fathers in any other known society, mothers are the main caretakers (Hewlett 1991*b*). The researchers have shed light on the fact that although forager mothers undoubtedly play a prominent role in child caregiving, considerable care of the mother and child is also undertaken by the society at large. This suggests that, in the study of child caregiving, we should consider not only tangible interpersonal interactions but also the sociocultural institutions that make up the background context of daily activities.

Second, the paper is notable for its scrutiny of the influence of subsistence patterns on infant feeding patterns. Despite the fact that researchers have pointed to the relationship between age at weaning and subsistence pattern, until recently few empirical attempts had been made to clarify the key measures by which these associations are established. In this respect, the comparison between Bofi farmers and foragers provides us with valuable data, as both groups live in the same natural ecology and speak the same language. This study indicates that Bofi farmers tend to wean their children earlier than do Bofi foragers. Contrary to the common assumption, however, neither group shows a drastic decrease in physiological investment after the cessation of breast-feeding, given that solid food is available for children in both groups before they are fully weaned. Meanwhile, consistent with Sellen and Smay’s (2001) hypothesis, features of maternal work appear to be particularly relevant to age at weaning in both groups: Bofi farmer mothers work longer than Bofi forager mothers at all weaning stages and substantially more after their children are fully weaned. Bofi farmers have a clear sexual division of labor, but this pattern is not evident among Bofi foragers (Fouts 2005). This point is likely highly relevant to the patterns of nonmaternal care among Bofi farmers and foragers. The weaning process constitutes the critical event for the configuration of the division of labor, as well as for the development of the parent-offspring relationship; both constitute the basic nexus of social relations. The weaning process, accordingly, can be seen as a cultivator of social relations rather than as the consequence of “modes of production.” This is a view that I am much in sympathy with.

The third contribution made by this study is that it seeks to situate both culture and biology in the complex web of factors that influence human behavior. Fouts et al. indicate that maximization of reproductive fitness in a particular ecology cannot fully explain the differences



in the behavioral patterns of these two groups. The variation can be understood as the realization of their cultural schemas, as well as of the social relations noted above. Admittedly, cultural schemas and patterns of social relations are transmitted nonbiologically from generation to generation (Hewlett, de Silvestri, and Guglielmino 2002). According to Fouts et al., however, culture and biology interact to produce specific weaning patterns among Bofi foragers and farmers. I find this claim to be reasonable, although more research into the interplay between culture and biology is greatly to be desired. A promising starting point, I believe, would be to elaborate hypothetical mechanisms of cultural transmission, such as those identified in Hewlett and Lamb (2002), through empirical studies in diverse societies. This approach would result in abundant material to help clarify the awkward relationship between culture and biology. At the same time, such research seems vital to the description of society as an inherently dynamic system.

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Breast milk contains 60 kcal/100 ml, substantially more than Coca Cola (42 kcal/100 ml), and from a monetary perspective is free. However, interpreted within the context of parent-offspring conflict theory, breast milk is not free, and its value to the infant must be offset against its cost to the mother. Breast-feeding requires calories and inhibits re-conception. The timing of weaning has long been recognized as a fundamental component of parent-offspring conflict, and the article by Fouts, Hewlett, and Lamb represents an intriguing contribution to our understanding of this process.

Fouts et al. investigate how different cultural practices interact with biological factors during the cessation of breast-feeding. Using an elegant study design, they compare weaning amongst Bofi farmers and foragers, two populations that have much in common in terms of genes and broader ecological environment but differ markedly in their subsistence patterns and in their weaning practices. They report that forager children show less distress at weaning compared with farmer children, who are weaned more abruptly. Their analysis highlights the roles that cultural and social factors play in mediating a biological process, but their results may be slightly more complex than they suggest.

Though parent-offspring conflict has a clear theoretical basis, there are currently at least four mechanisms proposed to underlie its resolution (Wells 2003). In each version, offspring signal their demand (often by vocalization) to parents, who respond by providing resources. First, offspring may simply blackmail parents into provisioning them, for example, eliciting the threat of predation. Second, competing offspring may contest access

to resources, with parents adopting a fairly passive role when allocating them. Third, offspring may honestly signal their need. Fourth, offspring may signal their worth or their likely future returns on current investment. Distinguishing between these different models is not easy and requires an understanding of how each mechanism maintains viability over time.

From a theoretical perspective, signals are predicted to be honest when the cost to the sender is high. Under such conditions, it does not pay to lie. But how can the cost of a signal be quantified? Recent work has suggested that simply counting the calories required for signalling may not be sufficient; it is necessary to demonstrate that the cost is apparent in terms of offspring fitness. In birds, signals of offspring need are honest when increased begging for resources adversely influences growth (Kilner 2001). In humans, the same mechanism may operate in early infancy, when a substantial component of energy intake is directed to growth; by one year, however, growth consumes < 5% of energy intake (Wells and Davies 1998). When signals impose minimal cost on the offspring, there is no constraint preventing them from reaching maximal intensity. Thus, the tantrums of toddlers are unlikely to be honest signals of nutritional need and are more likely to represent blackmail or sibling rivalry. An important point is that, in each case, signals are worth sending only if they continue to elicit a beneficial response.

By two-to-four years of age, the issue may therefore be emotional investment rather than calories. At this age, partial breast-feeding is unlikely to supply more than a modest proportion of total energy requirements. As Fouts et al. note, the cessation of breast-feeding tends, amongst Bofi farmers, to be accompanied by the cessation of physical comforting. Holding the child may not supply calories, but it does provide the more general message that parental investment will continue even as the mother conceives the next offspring. This potential double effect of weaning may explain two paradoxical findings of the study, only one of which the authors address.

Infant distress increased in both populations with the termination of breast-feeding but was greatest in the farmer children who were overtly prohibited from breast-feeding. This supports Fouts et al.'s argument that weaning practices contribute to the distress of weaning. However, while distress levels tend to decline with age, after weaning distress levels were *higher* in forager than in farmer children (4.9 versus 3.0 hrs/d), despite the former's being substantially older. If distress is regressed on age and group in those weaned, forager children cry significantly more ( $p < 0.05$ ). Why should forager children whinge when their parents have been so thoroughly nice about weaning and its aftermath? The answer may lie in the dynamics of signalling processes. By three-to-four years, farmer children are already caring for their younger siblings, and for much of the time their signals of distress will go unanswered. Forager children, still held and comforted by parents and relatives, have nothing to lose by voicing a little discontent to keep things cosy. Blackmail? Why not?

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The paper by Fouts, Hewlett, and Lamb addresses the cultural and biological context of weaning with respect to parent-offspring conflict theory with Bofi farmers and foragers in Central Africa. They report two distinct weaning styles for the farmers and the foragers. We suggest that the two styles are characteristic of general cultural models and therefore can be identified in cultural groups that share major dimensions of these models. We present evidence for similar strategies from Cameroonian Nso farmers and Fulani pastoralists. Although the Fulani are pastoralists, they share many characteristics with the Bofi foragers, as do the Nso with the Bofi farmers. Nso and Fulani also live in the same natural ecology and interact and trade together, although they speak different languages (Lamnso and Fulfulde).

The Fulani share with the Bofi foragers an egalitarian cultural model and grant children autonomy in daily life. They hold children extensively (but less than the Nso [Yovsi 2003]) and continue to do so during and after weaning. The mother remains the main caretaker. There is no pressure on the child to stop nursing. When Fulani women want to wean, they do so gradually by giving the baby more cow and goat milk and adding butter to its food. There may be also some rubbing of an unwanted substance (cow dung) on the nipple or consultation of the mallam to recite verses from the Koran for the child to stop nursing. Despite these measures, the Fulani believe that the children may stop nursing on their own. On the average, Fulani children are weaned at about two years—that is, substantially younger than Bofi foragers' children. The children of both the Fulani and the Bofi foragers experience a rather smooth transition and show little distress.

The Nso and the Bofi farmers share a hierarchical social structure and emphasize obedience, respect, and the authority of elders. They wean their children at comparable ages, mainly because of the maternal workload. They reduce the frequency of nursing by rubbing hot chilli or bitter leaves on the nipple or even putting a creeping caterpillar on the nipple to frighten the child. The mother may call other children to jeer at the child when he tries to nurse or stage frightening masquerades (*juju*) that threaten to take the child away. Some mothers squeeze breast milk onto the child's hand and force him to throw it on the ground, outside, or in the dustbin, pretending that it is bad. The frequency of carrying, holding, and intimate physical care decreases substantially after weaning. The child reacts with temper tantrums and negativity (Yovsi and Keller 2003). The mother virtually transfers child care to other caregivers, especially siblings and the grandmother. Sleeping with the mother is stopped at this point, the child going to sleep with siblings or grandmother (Yovsi and Keller 2004).

Breast-feeding is a moral obligation for both the Nso and the Fulani. For the Fulani it is the best thing a

woman can do for her husband. A Fulani husband may divorce his wife if the child is not lengthily nursed. It is believed that when the mother nurses a child, her qualities are transferred through the breast milk. A Fulani woman comments, "A child is nothing without breastfeeding. A mother who does not breastfeed her child according to the culturally mandated period makes the child a dependent who will never achieve anything of his or her own" (Yovsi 2003:149). For the Nso, nursing a child properly is required not only for his health and strength but also as a way of giving him cultural competence—obedience, conformity, respect for authority, and social commitment. A woman who refuses to nurse her child properly is considered a witch. It is believed that a child who is not properly nursed cannot acquire cultural competence. A Nso mother comments, "A woman who does not breastfeed her baby fully is a killer who needs to be isolated. . . . Breastfed children behave well and listen to advices. They are intelligent. They go quickly on errands when they are sent. Such children are very helpful and socially responsible" (Yovsi 2003: 150).

These examples support the arguments of Fouts, Hewlett, and Lamb that cultural models represent powerful scripts which frame the interactional strategies of weaning, whereas the physical resources may inform the timing.

## Reply

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We are encouraged that the commentators applaud our attempts to bridge the gap between biological and cultural perspectives by illustrating their complementary contributions. It is particularly gratifying that thoughtful and supportive comments are offered by both cultural and biological anthropologists; we had hoped to stimulate such interdisciplinary discussions. We also appreciate constructive comments on our methods and the introduction of additional ethnographic information about weaning in other cultures.

It was obviously not possible to provide sufficient cultural and ethnographic detail in the target article, as several commentators (Bird-David, Gottlieb, Korbin, and Haddix McKay) note, and we refer interested readers to a recent article providing additional qualitative interview data about parenting practices in general as well as about the parental selection of weaning methods more particularly (Fouts 2004). More thorough ethnographic descriptions of the Bofi foragers and farmers have also been published elsewhere (Fouts 2002, 2005).

Bird-David and Gottlieb raise an important question about our interview techniques, noting that a Bofi farmer man assisted in translation. This factor indeed deserves

further elaboration. The field researcher (Fouts) was conversational in the Bofi language and used the translator to (1) pose the questions in Bofi sufficiently clearly that the interviewee could understand them and (2) provide details that she might have missed after transcribing the interview. In other words, Fouts would ask the question in French and the translator would pose the question in Bofi. Fouts would listen to the response and take notes in English and then listen to the French translation to ensure that she had not missed any important details. Bird-David proposes that we view the interview process as a “revealing” experience in itself rather than simply as a tool for eliciting information. This is a valuable observation, as we indeed learned many things about the cultural schemas of Bofi farmers during interviews with Bofi forager parents. For example, even though the Bofi farmers and foragers spoke the same language, their usage often reflected unique cultural schemas and practices. Thus, Bofi farmers used the word *zallabili* for weaning from breastfeeding. Early in the fieldwork, however, several Bofi forager parents answered no when asked, “How did you *zallabili* [wean] your last child?” Further investigation revealed that three Bofi words can be used to describe the cessation of breastfeeding: *zallabili*, *kafabili*, and *gonabili*. The farmers predominantly use the word *zallabili* (*zalla* ‘to hide’, *bili* ‘nipple/breast’) whereas the foragers predominantly use the word *kafabili* (*kafa* ‘to refuse’, *bili* ‘nipple/breast’) *Gonabili* (*gona* ‘to stop’, *bili* ‘nipple/breast’) was used but not preferred by both foragers and farmers. For obvious reasons, we started using *gonabili* when posing questions about weaning so as not to presume a specific weaning technique or inadvertently endorse either the farmer or the forager practice.

Using a Bofi farmer as a translator was therefore problematic at times because he favored certain terms. For this reason, behavioral observations and simple demographic interviews were conducted before the more complex topical interviews to improve the field researcher’s language skills and alert her to differences in language usage between the two groups. Furthermore, formal interviews were crosschecked with informal interviews that occurred in various activity contexts during the day without the translator. Also, the interview data on weaning were generally consistent with the observational data (Fouts 2002, 2004). More extensive discussions of the interviews, interview methods, and ethnography have been published elsewhere (Fouts 2002, 2004, 2005).

Bird-David, Yovsi and Keller, and Haddix McKay all offer useful ethnographic information about weaning in the groups they have studied. We agree with Yovsi and Keller that the weaning styles of the Bofi foragers and farmers are characteristic of general cultural models. Fouts (2004) has examined the Bofi forager and farmer weaning styles in terms of cultural models and compared them with those of other tropical foragers and farmers, and Hewlett and Lamb (2002) have discussed child-care practices among the Aka foragers and Ngandu farmers in these terms. Yovsi and Keller’s data suggest that it would be worthwhile to consider other ecological and

subsistence contexts as well. The Fulani and the Nso studied by Yovsi and Keller have very distinct cultural models and child-care practices. Although like the Bofi foragers in many ways, however, the Fulani do not have higher rates of holding than the Nso (whose cultural models more closely resemble those of the Bofi farmers). According to Yovsi and Keller, although Fulani and Nso holding levels prior to weaning are similar, the Fulani hold their offspring more than the Nso after weaning. Their data are quite consistent with our argument that Bofi forager children are less distressed by weaning than Bofi farmer children in part because they continue to be held after weaning for substantial proportions of time, whereas for the Bofi farmer children weaning marks the end of intimate physical care. Yovsi and Keller’s data also highlight that the level of holding prior to weaning and throughout infancy may have less impact on reactions to weaning than the magnitude of the decrease that occurs around weaning. Interestingly, weaning occurs around the same age (two years) among the Fulani and the Nso, and this cautions us not to overstate the influence of age on the emotions of weaning children after studying only two cultures. Crespi and Sellen likewise stress the importance of multisite comparisons using standardized measures. We fully agree that more comparisons are needed before stronger conclusions can be reached, and we hope that this article and the commentaries will stimulate comparable research.

As Wells notes, although weaning did not predict levels of fussing and crying among the Bofi foragers, three- and four-year-old forager children cried more than their farmer counterparts, who were all weaned. Wells hypothesizes that this may be because forager children continue to benefit from signaling (fussing and crying) more than farmer children, who are often farther away from their parents. We fully agree, and we have addressed the high levels of fussing and crying among forager three- and four-year-olds in an intracultural analysis published elsewhere (Fouts and Lamb n.d.). We found, as Wells predicts, that maternal presence was related to higher levels of fussing and crying at all ages (i.e., children fussed and cried more when mothers could perceive the signal) and that individual family relationships and life-history characteristics (the mother-child attachment relationship, the quality of allo-care, and maternal pregnancy) explained the behavior of the three- and four-year-olds who had extreme levels of fussing and crying.

Commentators have diverse views of the way we described the role of alloparents in the weaning process, with Takada, Sellen, Wells, and Yovsi and Keller viewing this as a strength of the article and Gottlieb and Haddix McKay arguing that we did not adequately address the role of allo-care. The specific roles of fathers and grandparents during weaning have been described more extensively elsewhere (Fouts 2002, 2003), and we have recently collected new data that will allow us to compare the roles of alloparents among the Bofi foragers and the Aka foragers in Central Africa. Along with Haddix McKay, we would have liked to test specific predictions of parent-offspring conflict theory about allo-care. As noted

in our article, however, parent-offspring conflict theory does not consider the role of allo-care during weaning, and we hoped to illustrate how the theory could accommodate allo-care, along with cultural schemas and practices, in interpreting children's behavior and reactions to weaning. In contrast to the other commentators (Sellen, Takada, Yovsi and Keller), Haddix McKay also considers the fact that allo-care mitigates the distress of Bofi forager children "obvious" and suggests that it would have been more valuable to focus on the relative importance of allo-care in child-rearing strategies. The role of allo-care in child-rearing strategies is of great interest to us (Fouts 2003, Lamb 1998, Lamb and Ahnert n.d.), but our main goal in this article was to understand weaning children's behavior. In fact, many of the commentators (Bird-David, Gottlieb, Korbin) commend us for recognizing children as active agents whereas most anthropological studies of childhood have focused solely on parental decisions and behavior.

Although most of the commentators appreciate our integrated perspective, several (Crespi, Haddix McKay, Sellen, Takada) point out that we have a long way to go in understanding the interactions between biology and culture. We agree with Bird-David that evolutionary approaches need to be more precise in their use of "culture" but disagree with Gottlieb's assertion that our time was not well-spent in "attempting CPR on a theoretical model inspired by the long-defunct sociobiology." In fact, evolutionary approaches in anthropology are on the rise, as is illustrated by the growth in graduate programs in evolutionary anthropology. Furthermore, many scholars are working hard to dispel the notion that evolutionary perspectives are reductionistic by using integrative perspectives and publishing in interdisciplinary journals such as CURRENT ANTHROPOLOGY. This article and the many encouraging comments from both cultural and biological anthropologists clearly illustrate that biological and cultural perspectives are complementary and that the two perspectives can accommodate each other. We hope that our article and these thoughtful commentaries will encourage additional field research as well as rich intra- and interdisciplinary communication in the years ahead.

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