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# Showoffs or Providers? The Parenting Effort of Hadza Men

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Paternal care plays an important role in many scenarios of human evolution. Lately, however, this “Man the Provisioner” view has been challenged. The showoff hypothesis, for example, proposes that men hunt not to provision children but to gain extra mating opportunities, and some have suggested that male care among mammals is always a form of mating, rather than parenting, effort. This study, based on observation in a hunting and gathering society, the Hadza of Tanzania, tests whether men provide care as parenting effort. If male care were mating effort only, stepchildren should receive no less care than biological children. My data, however, reveal that stepchildren do receive less care. This suggests that care is provided, at least in part, as parenting effort. Although lower direct care implies stepfathers are less motivated to care for stepchildren, resource acquisition data raise the question of whether stepfathers are less motivated, or simply less skilled. © 1999 Elsevier Science Inc.

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Paternal care plays an important role in many scenarios of human evolution. For example, it has been argued that male care was necessary for the successful rearing of large-brained, helpless infants, selecting for long-term pair bonds (Lovejoy 1981; Washburn and Lancaster 1968). Recently, this “Man the Provisioner” view has been challenged. First, there is the question of whether men provide enough care to make much difference. Second, some have argued that men provide care only as mating effort (Hawkes et al. 1995; van Schaik and Paul 1996). This would not necessarily mean that male care is unimportant, but it would mean that men are not motivated to raise offspring fitness, only to maxi-

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mize mating success. This study was designed to test that argument in a hunting and gathering society, the Hadza of Tanzania. The Hadza are interesting because they are quite monogamous, which might lead one to suspect paternal care is important. Yet demographic data, so far, show no effect of father's presence or absence on offspring mortality.

Assuming males do provide care to enhance the fitness of young, we should expect them to provide care preferentially to their own offspring, (or close relatives). There is some evidence that men interact more with biological children than stepchildren (Flinn 1992), and that men are more likely to abuse stepchildren (Daly and Wilson 1996). But males may provide care for another reason. Any care a man gives to a child he knows to be his stepchild should not be counted as parenting effort. Because such care is likely exchanged for sexual access to the child's mother, it should be considered mating effort. Based on the results of several primate studies, Smuts and Gubernick (1992) concluded that friendships between males and females predicted male caring behavior better than did likelihood of paternity. Even when men provide care to their own children they may be exchanging care for continued sexual access to their wives. Given that internal fertilization makes paternity uncertain, some have questioned whether mammalian males ever provide care as parenting effort (Hawkes et al. 1995; van Schaik and Paul 1996).

Because there are potential fitness gains from providing care (1) to increase offspring fitness and (2) in exchange for sexual access, I assume male care may be provided for both reasons. However, because men's parenting effort has been questioned, I tested the hypothesis that male care is, at least in part, parenting effort. I will call this the Parenting Effort Hypothesis. This hypothesis does not imply male care is not partly mating effort, only that it is not wholly mating effort. If male care were given only as mating effort, we would not expect biological children to receive any more care than stepchildren. However, if level of care is adjusted in response to paternity, one can deduce the following:

Prediction: Men will provide more care to their biological children than to their stepchildren, all else being equal.

A man providing care to his biological children can receive fitness payoffs not only from continued access to his mate, but also from the enhanced fitness of his offspring. Because he is paid back in two ways rather than one, he can be expected to provide more care. "All else being equal" assumes age of child and residence is controlled for.

Parental care can be divided into direct care, such as holding or nursing, and indirect care, such as territory defense or resource acquisition (Kleiman and Malcolm 1981). If resource acquisition is considered in addition to direct care, the measurement of overall male care becomes problematic. If the men who provide the least direct care also provide the most food, it would not be easy to decide which men provide most care overall, and it is overall care that should reflect effort. One could add up the time devoted to both forms of care if one could get an accurate assessment of time devoted to indirect care. But accurately measuring foraging time would require subtracting time spent visiting and resting from the time men are out of camp. And

still, one would need to measure time men spent foraging for particular children, which would be next to impossible.

Even if one has a reliable measure of time devoted to indirect care, it may be a poor measure of the benefit a child receives. If a man spends all day foraging but has no food to show for it, it does not benefit the child any more than if he had not foraged at all. Therefore, foraging ability is as important as motivation or effort. It is easy to imagine how foraging success could vary among men; it is harder to imagine how ability to hold an infant could vary. Thus, direct care is a better measure of effort allocated. For this reason, resource acquisition data are used primarily to test for negative correlations. As long as men who provide more direct care do not bring back less food, it should be valid to conclude they provide more care overall.

Hunting often has been assumed to represent paternal effort on the part of men (Hamilton 1984; Lovejoy 1981; Symons 1979). However, time spent hunting large game may not reflect parenting effort. This is because time spent gathering or hunting small game might more reliably feed a man's household because small game and plant food are shared less widely and returns are more predictable (Hawkes et al. 1991; Kaplan et al. 1990). Hence, the showoff hypothesis argues that men hunt large game, which is shared widely outside the household, because they receive fitness returns in the form of extra matings or other social benefits (Hawkes 1990, 1991). This study was not designed specifically to test the showoff hypothesis, only whether all male care is mating effort. None the less, the results do bear on the question of whether men are showoffs.

## METHODS

The Hadza are nomadic foragers who live in northern Tanzania. They live in camps that are somewhat flexible in composition, and they move seasonally, primarily in response to the availability of certain plant foods. Women forage for berries, baobab (*Adansonia digitata*), and tubers. Men collect honey and use bows and arrows to hunt a variety of small and large birds and mammals. Although there are no post-marital residence rules, about 60% of Hadza couples live in a camp where the wife's relatives live (Woodburn 1968). Polygynous marriages are rare but divorce is common, resulting in a high degree of serial monogamy. Consequently, about one third of men with children at home have young stepchildren.

From October 1995 to July 1996, I collected data while living in six Hadza camps ranging in population from 12 to 108. The sample consists of nearly all Hadza who were still living as foragers and includes 223 people, with the primary focus on men who had children 8 years old and younger living with them. Living with a child refers to sleeping at the same hearth, which corresponded with being the primary adult male caregiver. The sample includes 31 such men with 49 children. Of these children, 30 were biological children of the man, 11 were stepchildren, and 8 were some other category, such as grandchild. Two other men and their children were excluded because both men were disabled and did not forage.

I collected three types of data: (1) behavioral observations, (2) interviews, and (3) resource measurement. The observational data of behavior were used for time allocation analysis (Altmann 1974). Instantaneous scan observations were conducted hourly from sunrise to sunset. All direct care variables were measured: (1) as a percentage of all scans, which can include time a man is out foraging; and (2) as a percentage of the time the man was actually present in camp (referred to as % present). A total of 34,312 person scans were conducted.

For all men who had at least one child 8 years of age or younger living with them, I conducted 30-minute focal individual follow observations, using the "One-Zero Recording Rule" (Martin and Bateson 1986). The day was broken into three equal parts of 4 hours each. In addition, night follows were done after dark but before people went to sleep. Consequently, for each man there were four time periods sampled randomly until all men had a minimum of one follow in each period, or a minimum of 120 minutes. A total of 14,820 minutes of focal samples of men with young children was conducted.

Formal interviews with adults were conducted individually ( $n = 99$ ). I asked each person several questions, such as the number of children and spouses they had had, who the best hunters were, and what was expected of a father and stepfather.

### **Paternity Assignment**

Because paternity tests were not feasible, paternity was established using several sources of information. There is a tendency for the Hadza to claim stepfathers are fathers. Therefore, I pursued the question informally whenever there was an opportunity. If children were old enough, I asked them directly. During formal interviews, I asked adults to name the biological fathers of all children in camp. Paternity assignments also were checked with a Hadza man who keeps track of Hadza births and deaths. Previous demographic information (Blurton Jones, personal communication) also was used to determine who the husband was at the time of a child's birth. By the end of my stay in each camp, there were no cases of paternity in dispute, with one exception. One man claimed a child was his own, whereas every other source of information indicated he was a stepfather. He was, therefore, counted as a stepfather.

### **Direct Care**

The variables used to measure direct care were those that emerged as salient during a pilot study. These were later condensed into the following list:

1. Near: within 3 meters, but excluding instances counted by other variables
2. Play: bouncing, chasing, wrestling
3. Communication: talking, listening, exchanging non-food items
4. Nurturing: carrying, holding, cleaning, feeding, pacifying.

All variables apply to children 8 years and younger, except for nurturing, which applies only to children 5 years and younger. Scans count daytime only, while follows include evening as well. Because 13 instantaneous observations per day accurately measure a man's presence or absence from camp and his proximity

to children, but miss many other activities, scans were used primarily for proximity and foraging time. Follows were used for all other direct care variables.

### **Indirect Care (Resource Acquisition)**

I weighed ad libitum all food resources brought into camp by anyone and recorded the person who acquired them. Weights were adjusted for the percentage of total weight that was edible, using others' estimates (Hawkes et al. 1991). Adjusted weights were multiplied by calories per kilogram as described elsewhere (Blurton Jones et al. 1989, 1996; Ulene 1995). The total amount of food a man brought into camp was used as a maximum estimate of his household provisioning. I assumed that each child in the household, whether biological or stepchild, got an equal share in the free-for-all of food distribution. Ignoring child's age, it seems likely that each child gets the same amount of food because the eagerness with which children grab food when it appears ensures the food is shared pretty equally within households. Resource acquisition is, therefore, in most cases expressed as per capita calories, i.e., the number of calories a man brings in divided by the number of all children (biological and stepchildren, 8 years and under) in his household. This should not be read as the amount of food each child actually received, which would be extremely difficult to measure. It is only an estimate of what each child could have received if all of the food went to the household only and was shared equally among children in the household. This estimate ignores the degree of food sharing outside the household. How widely food is shared often depends on the type of food, with meat usually shared more widely (Hawkes 1993; Kaplan and Hill 1985). Meat returns were, therefore, also treated separately.

All *p* values reported are for two-tailed tests, except those that are for direct tests of the prediction that direct care should be greater for biological children. Direct tests are reported as significant with one-tailed tests (and so noted) because the hypothesis predicts the direction of difference.

## **RESULTS**

Table 1 shows how the Hadza compare with other foragers. Fathers held their biological infants (9 months and under) for an average of 19.5 minutes per day (2.5% of the daytime) and 30.2 minutes per day plus early evening (which was 5.6% of the time they were in camp during the day and early evening). Men who had children at home nurtured them for 1.9% of the daytime, whereas women with children nurtured them for 14% of the daytime. Of all food brought into camp, about 40% of calories were supplied by males and 60% by females.

### **Direct Care**

The hypothesis predicts that men will provide more direct (and overall) care to their biological children than their stepchildren. The dependent variable was the level of

**Table 1. Holding of Infants Among the Hadza Compared with other Foraging Societies**

Population	Age of infants (months)	Father holding (% of time)	Source
Aka Pygmies	1–4	22.0	Hewlett 1991
Efe Pygmies	1–4	2.6	Winn et al. 1990
Gidgingali	0–6	3.4	Hamilton 1981
!Kung San	0–6	1.9	West and Konner 1976
Hadza ( $n = 8$ ) (scans)	0–9	2.5	Marlowe
Hadza ( $n = 8$ ) (% present)	0–9	5.4	Marlowe
Hadza ( $n = 8$ ) (follows) day and evening	0–9	5.6	Marlowe

Data on Hadza are for biological fathers only and data on other societies are from Hewlett 1992, presumably also for biological fathers only.

direct care provided by a man to each of his dependents. Therefore, the unit of analysis was the child. The independent variable was the child's status as biological child ( $n = 30$ ) or stepchild ( $n = 11$ ).

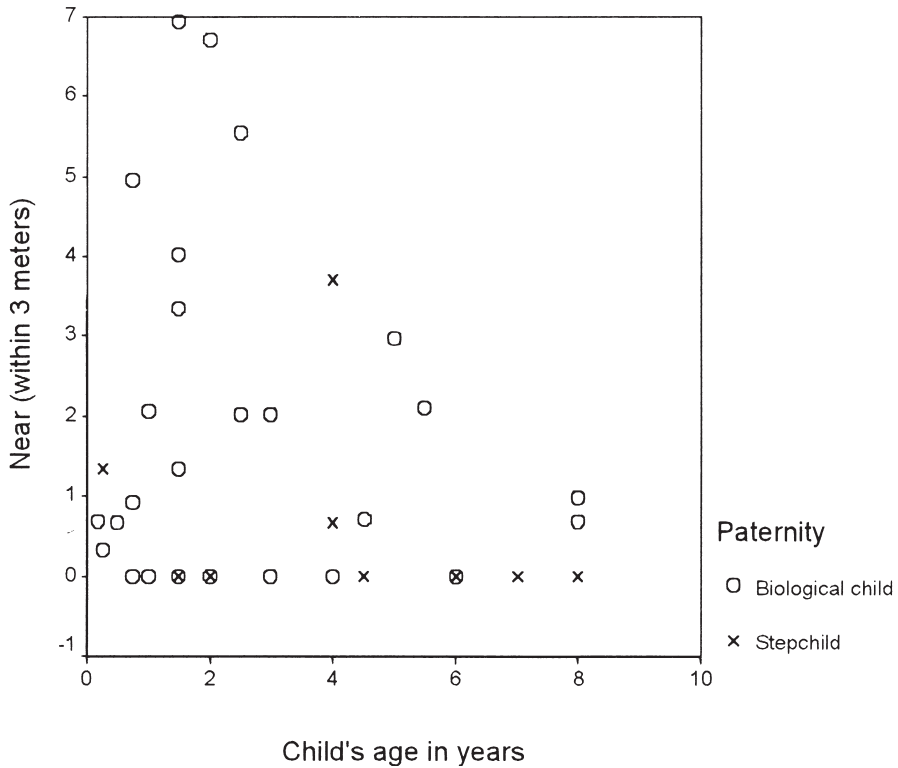
Most direct care variables were significantly correlated with child's age, and mean age for stepchildren (4.57) was significantly greater than for biological children (2.64). Therefore, for most variables, it was necessary to control for age. For those forms of direct care that are not significantly correlated with age and not normally distributed, Mann-Whitney  $U$ -tests were used. Figure 1 reveals that men spent more time near their biological children than near their stepchildren ( $U = 96$ ,  $p = .017$ , one-tailed,  $n = 41$ ). As a percent of time men were present in camp, they were also near their biological children more ( $U = 94.5$ ,  $p = .015$ , one-tailed,  $n = 41$ ).

Play was negatively correlated with age for biological children but not for stepchildren, because stepchildren were never once played with by their stepfathers. Therefore, a straight comparison could not be done. However, after excluding children older than 5 years, there was no significant correlation with age, and biological children were played with more ( $U = 42$ ,  $p = .027$ , one-tailed,  $n = 31$ ) (Figure 2).

If care is depreciable, a man's care would have to be divided up more in households with more children. Therefore, multiple regression was used for those forms of direct care that were correlated with age, and normally distributed. The direct care variables were first regressed on child's age and the number of all children (biological and step) in the household, and then on paternity status.

Controlling for age and number of all children at home, communication between man and child was higher for biological children than stepchildren (Beta = .3034,  $p = .042$ , one-tailed,  $df = 37$ ) (Figure 3). And, controlling for age and number of all children at home, biological children received more nurturing from their fathers than stepchildren did from their stepfathers (Beta = .2948,  $p = .043$ , one-tailed,  $df = 27$ ) (Figure 4).

It is worth noting that the one stepchild who received the most nurturing from his stepfather is a special case (Figure 4). The Hadza practice the levirate, and this child's stepfather is also his uncle, because he married his dead brother's wife. The



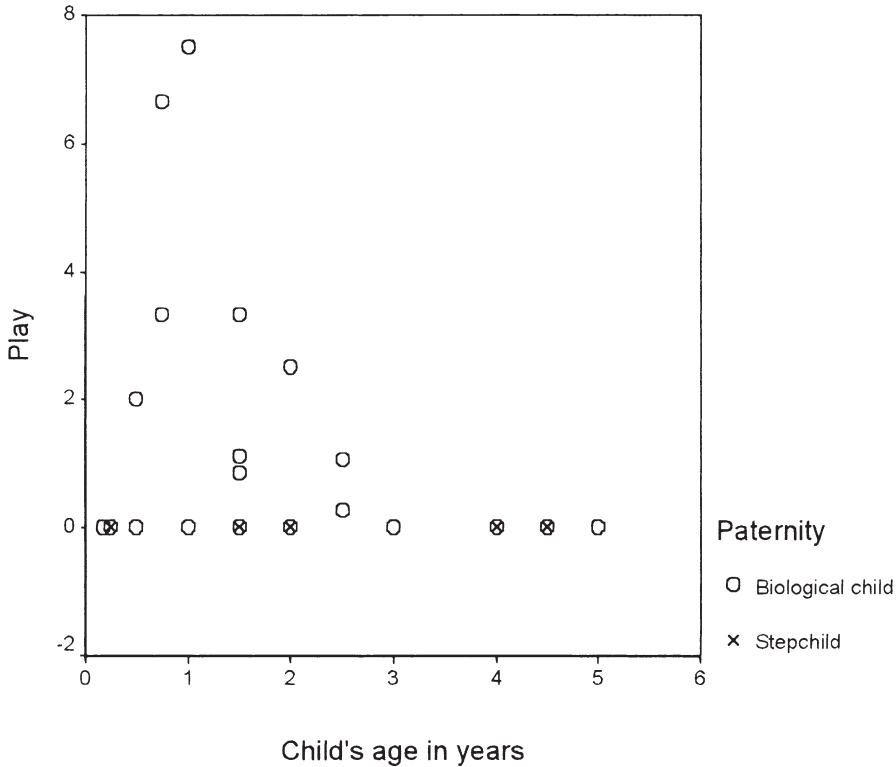
**FIGURE 1.** The percentage of time (daylight hours) men spent near their biological children and stepchildren of different ages. Near was measured as the father and child being observed within 3 meters of each other. Data were taken from daily scans.

expected degree of relatedness, therefore, between stepfather and stepchild is .25. This was also the only stepchild under 1 year old, which may reflect a tendency for men not to marry women who have very young children. Such women would be nursing longer and likely to resume cycling later than women with older children.

In interviews, almost all people said that stepfathers were expected to care for stepchildren the same as biological fathers and that men felt the same about their stepchildren and biological children. When I asked if it was exactly the same, however, only 54.3% still maintained there was no difference, whereas 45.7% said men felt closer to their biological children ( $n = 70$ ). There was no difference between men and women, nor between those in a marriage with or without a step-relationship. Because most people claim there is no difference between fathers and stepfathers, and yet the data reveal that there is, it seems that deception is involved in promoting the ethic that stepfathers should be good fathers.

## Resource Acquisition

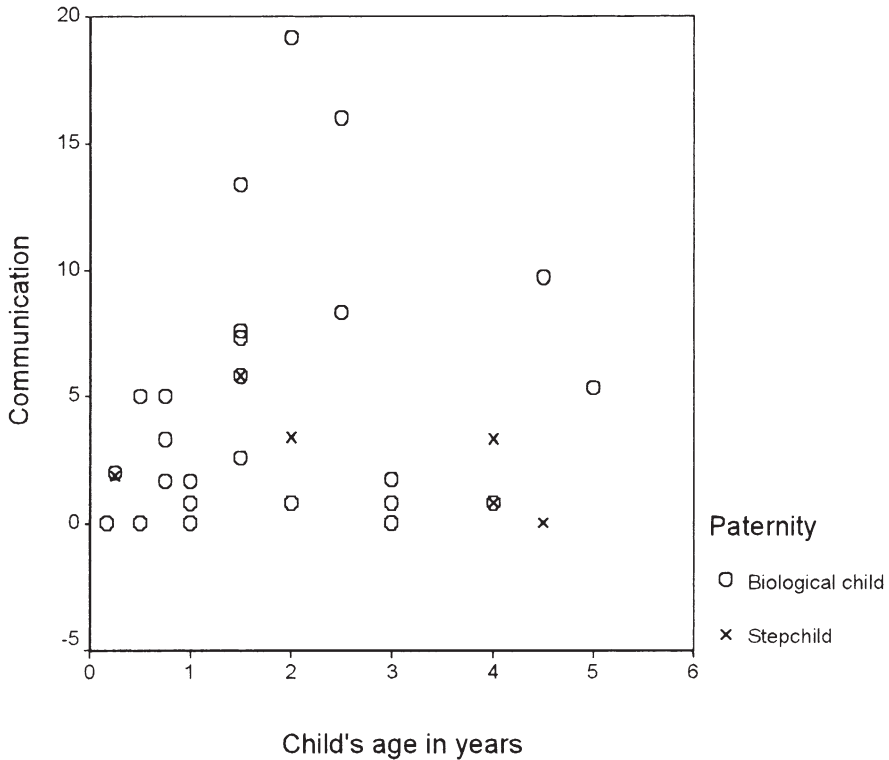
Before drawing any conclusions about the overall level of care children received, it is necessary to consider how much they may have been provisioned. Men can be both biological fathers and stepfathers at the same time. However, when men were



**FIGURE 2.** The percentage of time (in focal follows) men spent playing with their biological children and stepchildren of different ages. Play was measured as the father being observed bouncing, chasing, wrestling, etc., with the child. Data were taken from focal follows of the father.

divided into two categories [men who had only biological children at home (biological fathers) and men who had at least one stepchild at home (stepfathers)], biological fathers brought back more food. The average amount of food of all types brought back to camp per day, divided by number of all children in a man's household (per capita overall daily calories), was 1,901 kcal for biological fathers ( $n = 15$ ) and 877 kcal for stepfathers ( $n = 10$ ). The amount of per capita daily meat calories was 349 kcal for biological fathers and 63 kcal for stepfathers. Therefore, most calories are from nonmeat items: 1,552 per capita daily calories for biological fathers compared with 814 for stepfathers. Biological fathers brought in significantly more per capita daily meat calories ( $t = 2.84$ ,  $p = .012$ ,  $df = 16$ , unequal variances) and had a higher per capita hourly meat return rate ( $t = 2.54$ ,  $p = .024$ ,  $df = 15.1$ , unequal variances).

If men cannot control the allocation of food within their households they may be less motivated to provision if they have a stepchild, even when they also have a biological child. A man with one biological child and one stepchild will receive only half the payoff of a man with two biological children and may, therefore, be only half as motivated to forage for them, choosing instead to pursue other benefits. Therefore, correlation also was used to test for the effect of the number of stepchildren on a man's per capita provision-

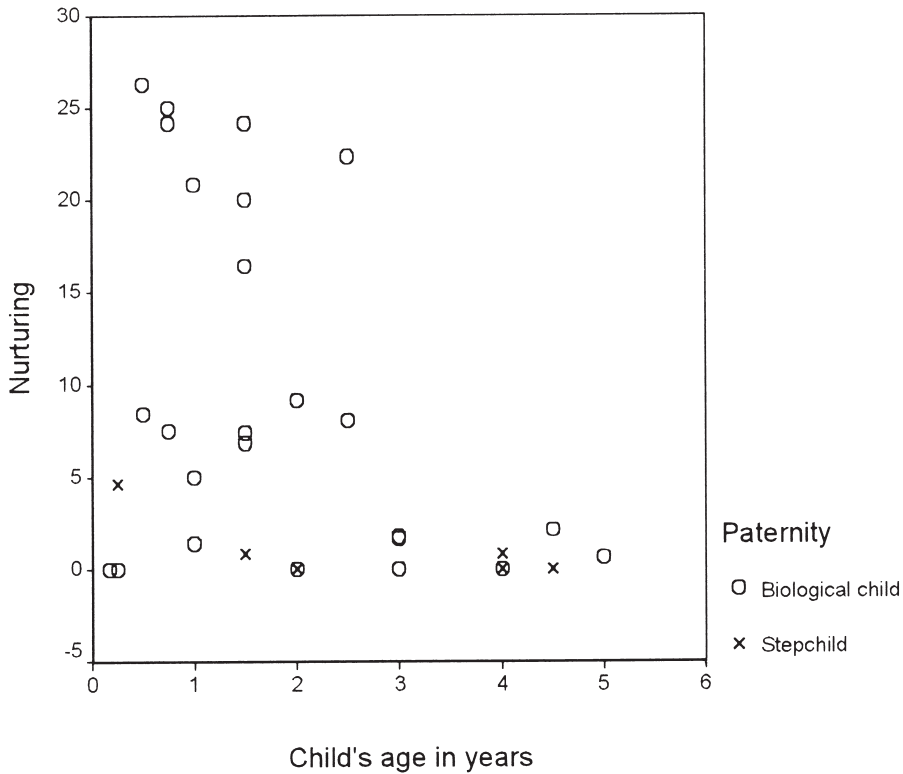


**FIGURE 3.** The percentage of time (in focal follows) men spent communicating with their biological children and stepchildren of different ages. Communication was measured as father being observed talking, listening, or exchanging nonfood items with the child. Data were taken from focal follows of the father.

ing. The number of stepchildren is negatively correlated with per capita daily overall calories ( $r = -.3998$ ,  $p = .048$ ,  $n = 25$ ), per capita daily meat calories ( $r = -.4215$ ,  $p = .036$ ,  $n = 25$ ), and per capita hourly return rate ( $r = -.4071$ ,  $p = .043$ ,  $n = 25$ ).

Using men as the unit of analysis ignores any effect child's age might have on men's provisioning. Therefore, I controlled for child's age and number of all children in the household in a multivariate analysis. Assuming my estimate of maximum possible provisioning is valid, biological children likely received more daily calories (Beta = .3682,  $p = .022$ ,  $df = 37$ ) and more daily meat calories (Beta = .4422,  $p = .006$ ,  $df = 37$ ) than stepchildren, even though their providers were gone from camp about the same amount of time (Beta =  $-.0838$ ,  $p = .612$ ,  $df = 37$ ). Of course, if a stepchild was in a household with biological children I assumed they got equal shares, but if they were not, they stood to get less. Even though this is only an estimate, not the amount of food each child actually received, it does mean it is highly unlikely that biological children received less provisioning, which is the important point.

But did men who provided less direct care bring back more food? In other words, is there a problem in assessing overall care due to negative correlations between direct and indirect care? Using children as the unit of analysis and controlling



**FIGURE 4.** The percentage of time (in focal follows) men spent nurturing their biological children and stepchildren of different ages. Nurturing was measured as the father being observed carrying, holding, cleaning, feeding, or pacifying the child. Data were taken from focal follows of the father.

for age of child, there were no negative correlations between any measure of direct care received and any measure of father's per capita resource acquisition. On the contrary, because there were some positive correlations, men who provided more direct care tended to bring back more food. Because there were no negative correlations between indirect and direct care, it is clear that resource acquisition does not negate the relationship found between direct care and paternity status.

It should be noted, however, that in extreme cases, men may compensate for lack of indirect care. The two excluded men, who were disabled and did not forage (and who had only biological children), provided higher levels of direct care than any of the men who were included in the sample. If they had been included, their effect would have been to strengthen the influence of paternity on direct care while making it weaker for indirect care.

### Hunting Success and Reputation

Because a man's hunting returns are highly variable in the short term, hunting reputation is probably a better measure of a man's long-term hunting success (Hawkes et

al. 1991). In interviews, men and women were asked to name three men they felt were the best hunters. Men's hunting reputation then was ranked according to the number of times they were nominated. Hunting reputation appears to be deserved. Controlling for age, a man's hunting reputation was correlated with his overall returns ( $r = .3198, p = .014, df = 56$ ) and his hourly return rate ( $r = .3096, p = .018, df = 56$ ). Meat returns were just shy of significant, probably because of the greater short-term variance of hunting success.

It is interesting that men who had the best hunting reputations, controlling for age of man and number of biological children at home, did not provide less nurturing to their biological children ( $r = .0502, p = .838, df = 17$ ). We might expect them to provide less direct care because, if the showoff hypothesis is correct, they should have greater access to potential mates and, therefore, might be expected to allocate more time to extramarital mating effort, reducing the amount of time available for direct care at home.

Because some people tended to nominate only those men who were still good hunters, while others nominated, in addition, men who were good hunters long ago, hunting reputation is less reliable for older men. When men 60 years and older are excluded, hunting reputation correlates with reproductive success. For example, controlling for age, men with the best hunting reputations had more children born ( $r = .3174, p = .043, df = 39$ ), and more children surviving ( $r = .3570, p = .022, df = 39$ ). Of the men with either a biological or stepchild at home, those with the best hunting reputations had more biological children at home ( $r = .4387, p = .036, df = 21$ ). Of the men who had biological children at home, those with the most biological children at home had a higher hourly meat return rate ( $r = .4879, p = .025, n = 21$ ). This finding is especially interesting because Hawkes et al. (in preparation) argue that men are not trying to provision children when they target game, in part because there is no correlation between meat returns and number of children at home. I too found no correlation when stepfathers without biological children at home were included. But using only those men who had at least one biological child at home, the more biological children men had, the more meat they brought in per foraging hour. Therefore, men who have more biological children at home may be motivated to bring back more food.

Given that men appear to earn their reputations as good hunters and that reputation was positively correlated with reproductive success, it is interesting that hunting reputation, controlling for age, was not significantly correlated with the total number of wives one had had in life ( $r = -.0162, p = .910, df = 49$ ). This says nothing about number of affairs, of course, of which I have no measure. Still, good hunters may be as likely to be "dads" as "cads" (Draper and Harpending 1982). Good hunters had more biological children, and biological children received more direct care. Stepfathers, on the other hand, were less successful hunters than biological fathers (or less motivated), had lower hunting reputations ( $t = -2.782, p = .012, df = 19.4$ , unequal variances), and yet they had had more wives ( $t = 2.186, p = .040, df = 22$ , equal variances). And controlling for age of man and number of biological children at home, men who had had more wives provided less nurturing to biological children ( $r = -.5461, p = .016, df = 17$ ). This may be measuring the de-

gree to which men pursue a cad-like strategy, because it includes only men with at least one biological child at home. Having had more wives was not only correlated with less investment in one's stepchildren but one's own children as well.

That male care may be somewhat important is suggested by the fact that, controlling for man's age, the number of wives men had was positively correlated with the number of children born ( $r = .3033$ ,  $p = .031$ ,  $df = 49$ ), but not the number of children surviving ( $r = .1733$ ,  $p = .229$ ,  $df = 48$ ). It appears that men who often divorce and remarry, and so had more wives, may have a lower offspring survivorship per wife. It may be, however, that men who had more wives are getting the least desired women. If so, they could end up with a lower number of children surviving per wife, due to wife's qualities rather than husband's (although this would not account for why men invest less in their own children when they had more wives). It is also possible that the correlation between hunting reputation and number of surviving children (which was stronger than between reputation and number of children born) is due to the best hunters marrying women who are the best foragers, as found by Hawkes et al. (in preparation). Still, it may be that male care is important, even though preliminary data show little effect of father's presence on offspring mortality (Blurton Jones et al. 1996). One way by which good hunters could gain their reproductive advantage without having more wives is by providing sufficiently for a wife and children to shorten interbirth intervals.

## DISCUSSION

The results of this study support the hypothesis that male care is, at least partly, parenting effort. But how important is male care? Even if the amount of time men allocate to direct care is low, it may be important if there is no one else to relieve mothers at crucial times, such as just before or after giving birth. Some forms of care are depreciable: food provisioning certainly is, and nurturing (e.g., holding) may be as well; babysitting (e.g., being within earshot) probably is not. Even if babysitting normally entails little cost to a man and little benefit to a child, all it would take is the occasional, potentially deadly, accident for babysitting to pay greatly. Women normally take suckling infants with them foraging, but leave young children in camp if they are weaned. Babysitting by men allows women to forage unencumbered by toddlers. And men spend, on average, 6 daylight hours in camp, during which time they could be babysitting.

The showoff hypothesis proposes that men are not trying to provision their households, but data here suggest that they may indeed be trying to provision their biological children. Even hunting may be an effective strategy. Because big game is more widely shared, however, the greater amount of meat the best hunters bring in may not go to their children any more than to others in camp, although there is now some evidence the hunter keeps a slightly larger share for his household (Hawkes et al. in preparation). Likewise, the greater meat returns of biological fathers relative to stepfathers may not translate into greater provisioning of biological children. However, most calories are not meat and so probably do reflect household provisioning.

There are three possible explanations for why stepfathers bring in less meat. (1) Stepfathers are less motivated to bring back food because some of it goes to stepchildren. (2) Stepfathers are poor hunters. Because of this, they are of lower mate value to women. Because they are less preferred, they only acquire women after better hunters have had their pick. The women available to them may be those women who already have young children. This would make poor hunters more likely than good hunters to become stepfathers. (3) Stepfathers tend to be men who pursue a more cad-like strategy. They do not provision much (or provide much direct care). Because they do not invest much, they do not mind marrying women who have young children. This makes cads more likely to become stepfathers. If stepfathers are cads, they should have a higher number of wives over time, because that is practically the definition of a cad—and they did. Of course, this also could be because they cannot hang on to their wives as well. But if women prefer better hunters, we need to explain why they do, if it is not because of better household provisioning.

When I asked men if they could increase their chances of having an affair on safari by offering meat to a woman, several men said yes. And I have observed them trying. Yet it is rare that a man can exchange meat for sex directly because, once in camp, he cannot keep meat hidden and so must share it with everyone. Of course, the inability to make direct exchanges is precisely why a man must show off by sharing with everyone. Once meat is shared out, however, he loses his leverage. If a woman repays him with sex, she is providing a public good others can free-ride on. Because the showoff provides more meat, other men may have to show greater tolerance of his affairs with their wives. Or perhaps single women might pay him back. But which woman and why her? It might be more plausible that, if women are choosing to have affairs with the best hunters, it is because they are gene shopping and hunting success is a good genes indicator. I assume men try to show off, but it is not yet clear if it pays, because it is not clear whether in return for their meat, men gain additional extramarital mating opportunities or better treatment of their children.

In conclusion, contrary to the view that male care is mating effort only, paternity predicted level of direct care, suggesting it is at least partly parenting effort. Direct care is probably a more reliable measure of a man's parenting effort than is resource acquisition, which may reflect ability as much as motivation. Even resource acquisition, however, may to some extent reflect parenting effort on the part of men.

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