ANDREW J. NOSS
Wildlife Conservation Society
Casilla 2417
Santa Cruz, Bolivia

BARRY S. HEWLETT
Department of Anthropology
Washington State University
Vancouver, WA 98686

The Contexts of Female Hunting in Central Africa

This article examines female hunting among a group of Aka forest foragers ("pygmies") of the Central African Republic,[1] where women net-hunt more frequently than men. The study aims to understand the contexts of female hunting and allay the paucity of descriptive and systematic studies of women hunters and gender task allocation among foragers. Contexts predicted from human behavioral ecology and cultural anthropology are considered and evaluated. Most of the contexts for female hunting predicted by the evolutionary and cultural theoretical orientations occurred among this group of Aka: game were relatively abundant, and women received relatively high caloric returns from hunting; game animals were acquired synchronously; hunting took place with other adults; Aka women had access to the means/technology of efficient hunting; Aka male ideological/political control of women was minimal; and cultural precedents existed that enabled women to obtain knowledge of and experience in hunting. Modifications to both evolutionary and cultural theories that deal with female hunting and gender task allocation among foragers are suggested, and an integrated approach is described. *[foragers, central Africa, sexual division of labor, women hunters]*

It is obvious that women can hunt, but they do not do so in all contexts. The primary aim of this article is to describe the cultural and environmental contexts of female hunting among one group of Aka forest foragers ("pygmies") of the Central African Republic,[1] where women net-hunt more frequently than men. Larger theoretical issues regarding gender allocation of tasks among foragers are considered once the specific contexts have been described and analyzed.

Ethnographers sometimes mention that women hunt, but few studies have systematically evaluated the contributions of women hunters. For instance, Brightman (1996) indicates that many Woods Cree women trapped furbearing animals alone or in groups and that some women, both married and single, hunted moose, caribou, and bear. Romanoff (1983) describes Matses women in the Peruvian Amazon who accompany their husbands, helping to chase and kill animals, while Hurtado et al. (1985) indicate that Ache women in Paraguay help men search for and transport captured animals, occasionally killing animals themselves. Biesele and Barcaly (2001) describe excellent Ju/'hoan women trackers of large game who accompany their husbands and contribute substantially to their hunting success. While these are important ethnographic descriptions, the ethnographers provide few details about the contexts, frequency, and significance of female hunting. An exception among these descriptive accounts of women hunters is the systematic study of Agta women hunters by Estioko-Griffin (1985, 1986) and her colleagues (Estioko-Griffin and Griffin 1981; Goodman et al. 1985). Most Agta women hunt, and a limited number of Agta women are proficient hunters with bows and arrows, machetes, knives, traps, and dogs. Their study is important because it has demonstrated that (1) women hunters with young children did not experience higher child mortality than women with children who did not hunt and (2) female hunters can be just as efficient/successful as male hunters. However, Agta women hunted substantially less than men and tended to hunt in groups and with dogs for smaller animals.

Theoretical and Ethnographic Background

Researchers from two general theoretical orientations—evolutionary and cultural—have identified contexts in which women are likely to hunt. Enormous diversity exists within each of these theoretical orientations, but the assumptions that guide their hypotheses are distinct. A brief survey of the current literature in each orientation is provided before an ethnographic overview of the Aka is presented. We refer readers to Mukhopadhyay and Higgins (1988), Bird (1999), and Brightman (1996) for recent and

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more exhaustive literature reviews on the sexual division of labor among foragers.

Evolutionary Perspectives

Several quite distinct approaches to human evolutionary biology exist (Smith 2000), but researchers in human behavioral ecology (HBE) have contributed the greatest number of studies on the sexual division of labor among foragers (Bird 1999; Hawkes 1991; Hurtado and Hill 1990). HBE generates hypotheses about human behavior starting from the assumption that human activities should enhance reproductive fitness. Human behavior is flexible, and few behaviors are hardwired (i.e., genetic), but humans are predicted to try and maximize fitness within their demographic, ecological, and cultural environments. Behavioral ecologists use Trivers's (1972) parental investment theory to explain why men and women have different reproductive strategies and trade-offs in a given environment. Because human females invest more in offspring than males do, the trade-offs of alternative subsistence tasks are different for females than for males.

Human behavioral ecologists have contributed to major revisions of anthropological views of the sexual division of labor. Hawkes et al. (1997) indicate that males have more to gain reproductively by "showing off" than females do and thereby gain status and prestige in the community. A successful male hunter may substantially increase his reproductive fitness by attracting another wife or through extramarital relations. Because women have invested more time and energy in children than men and know that their children are theirs, they are predicted to focus on providing for their children on a day-to-day basis. Among most foragers, prey that are widely shared with others are usually asynchronously acquired, provide large amounts of meat, and are associated with high risk of failure. Male hunters who target these widely shared game animals succeed not by providing more for themselves or their families but by gaining favorable attention or increased mating opportunities. In contrast, smaller sized prey that are reliable and not widely shared are often consumed by family groups. Hunters who target these resources derive immediate benefits from provisioning their families. Hawkes et al. make the point that men's big game hunting, which was previously regarded as parenting effort (i.e., provisioning the family) in the hunting hypothesis, may often be mating effort. Fathers are showing off rather than providing. Women, grandmothers in particular, according to Hawkes et al., are the consistent providers for forager families with young children. Hawkes et al. do not directly address the issue of female hunting, but if women are the day-to-day providers for their families and if women regularly hunt, then they should hunt for small and medium-sized game that is regularly acquired and shared within the family rather than for large game that is irregularly acquired and shared with the entire community.

The Hawkes et al. theory is useful for predicting the types of game animals women should hunt, but it does not help to predict the contexts in which women might hunt rather than gather or engage in another subsistence activity. Other human behavioral ecologists (Bailey and Aunger 1989) argue that women are likely to hunt in contexts in which hunting produces more calories per unit of time than other subsistence alternatives. Bailey and Aunger (1989) compare Mbuti forager women's participation in net-hunting with Efe forager women's participation in horticultural labor (i.e., assisting Lese farmer women in their fields). Their research indicates that Mbuti women net-hunted because they obtained more calories per unit of time from net-hunting, in large part due to meat markets in the Mbuti area, than they would have from providing labor to village women in exchange for village crops (e.g., manioc, corn). Efe forager women did not hunt because meat markets did not exist in their area and they obtained more calories per unit of time from helping horticultural women than they could from hunting. Efe women received manioc and other village crops in exchange for their labor, while Mbuti women sold/traded meat from the hunt for village crops. This finding is also consistent with the Agta in Estioko-Griffin's (1986) study, which indicates that Agta women hunted, in part, because of high return rates in comparison with horticulture—women hunted in the most remote parts of the forest where returns were high. Human behavioral ecologists predict that women are more likely to hunt in contexts in which hunting is more productive than alternative subsistence activities.

The hypothesis that women do not hunt because they are constrained, burdened, or immobilized by child care activities because they are concerned about the survival of their infants has a long history in anthropology (Brightman 1996; Kelly 1995; Mukhopadhyay and Higgins 1988). This hypothesis is consistent with HBE in that females are predicted to be more concerned than men about trade-offs with child care. Hurtado et al.'s (1992) time allocation data demonstrate that Hiwi and Aché women with infants gathered less than women without infants. These authors suggest that Hiwi and Aché women gathered rather than hunted because women were more likely than men to be concerned about health risks that might lead to increased maternal or child mortality. However, the authors do not present data to evaluate the hypothesis, and the study of Agta women hunters suggests otherwise. Recent research among Australian foragers and a review of the HBE literature point out that women's trade-offs with child care "may explain variability in time allocation of food production according to reproductive status, but they do not explain differences in the resource choice of men and women" (Bird 1999:72). That is, women with infants may

work less than other women, but there is no evidence that infant care explains why women gather rather than hunt. The Agta data are consistent with this recent view, in that Agta women who regularly hunted did not experience greater infant or child mortality than women who engaged in gathering or farming (i.e., hunting does not lead to "risks" and greater child mortality), but women with infants did not hunt as frequently as women without infants. Agta hunting requires stalking and stealth that may not be as compatible with infant care as other hunting techniques (e.g., driving or flushing animals into nets). It is important to mention that HBE does not focus on lack of female strength as a factor to explain why women do not hunt or the types of game women hunters may target.

Cooperative female hunting is also predicted from an evolutionary perspective. Cooperative hunting may lead to greater sharing of captured animals and decrease the day-to-day variability in returns from hunting (Hames 1989). Cooperative hunting may also decrease the risk of rape, capture, or violence to women and children by neighboring males (Hrdy 1997). In summary, an evolutionary perspective predicts that frequent female hunting is most likely to occur when risk of pursuit failure is relatively low, caloric return from hunting is relatively high in comparison with that of other subsistence options, animals are acquired synchronously (i.e., on a regular basis), women do not have infants (unless the hunting technique is consistent with infant care), and hunting takes place with other adults.

Cultural Perspectives

Considerable theoretical diversity also exists within the "cultural" orientation on the sexual division of labor, but in general cultural anthropologists tend to reject evolutionary perspectives and emphasize the cultural and historical construction of the sexual division of labor. For instance, Brightman characterizes evolutionary approaches as "hegemonic" and concludes that "physiological theories are irrelevant to the foraging division of labor" (1996:718). His literature review suggests that gendered classifications are completely arbitrary and the consequence of cultural taboos, gender identities, and gender politics. Specifically, he hypothesizes that women seldom hunted because they were excluded from the technological means of hunting (i.e., taboos were utilized to exclude women's use of weapons—spears, arrows, harpoons, and guns). He points out that even among the Agta, men hunted alone with bows or guns and used stalk or ambush techniques, while most women hunted in teams with dogs and machetes (Estioko-Griffin 1985:23–24). He indicates that female hunting may be less efficient than male hunting but for cultural rather than physiological reasons. He concludes that "the sexual division of foraging labor derives from the interested appropriation by men of hunting labor and the social capital accruing to its products" (1996:718). Brightman's review predicts that women will hunt more frequently when male control ideologies/politics are minimal and taboos do not exclude women from hunting technology.

Ethnographic decision-making models of the sexual division of labor (Gladwin 1989; Mukhopadhyay 1984) also have important implications for understanding female hunting among foragers, especially in culture change situations. This perspective is important because the group of Aka in this study are experiencing relatively rapid economic change. The ethnographic decision-making approach indicates that every culture has "precedents" or schema for deciding gender task allocation. "Cultural precedents" refer to role-based obligations/responsibilities (Mukhopadhyay 1980) as well as knowledge, experience, and feelings about specific subsistence activities/tasks (D'Andrade and Strauss 1992). Cultural precedents have histories, are both dynamic and conservative through time, and are utilized by individuals to make task-allocation decisions. For instance, Hewlett (1996) utilizes a "cultural" approach to critique the Bailey and Aunger evolutionary hypothesis described above. The critique emphasizes that Mbuti women net-hunted because of a long culture history with Bantu-speaking farmers who net-hunted. Congo Basin foragers who net-hunted (e.g., Mbuti, Aka, Bakola/Bagyeli, and Bongo) had long social-economic histories with Bantu-speaking horticulturalists who hunted with nets, whereas forager groups that did not use nets (e.g., Efe and Baka) had long social-economic histories of relations with Oubanguian or Sudanic speakers who hunted with bows and arrows, traps, or spears. The critique also demonstrates that Mbuti women were net-hunting long before a market for meat existed.

Feminist and praxis-based cultural anthropologists also argue against a "homogeneous" view of men or women and argue for a more contextual analysis of the social roles of "sisters," "wives," "daughters," or "grandmothers." This is consistent with the evolutionary perspective in which costs and benefits of an individual's reproductive strategies are predicted to vary according to different natural and social environments encountered during the life course. But the perspectives diverge as follows: evolutionists hypothesize that all task-allocation decisions maximize an individual's reproductive fitness, whereas cultural anthropologists are more likely to hypothesize that the variation in task decisions is patterned by how the individual negotiates the culturally and socially constructed aspects of daily life, having little to do with reproductive fitness. In summary, "cultural" approaches suggest that female hunting is most likely to occur when women have access to the means/technology of efficient hunting, male ideological/political control of women is minimal, and cultural precedents exist that enable women to obtain knowledge of and experience in hunting.

Female Hunting among African Forest Foragers

Historical records indicate a long tradition of women hunters in central Africa. Andrew Battell, an English sailor who was taken as a prisoner of war in Brazil by the Portuguese and then sent by them to present-day Angola around 1590, described pygmy hunters to a friend: "The women carry bow and arrow, as well as men, and one of these will walk in the woods alone, and kill the Pongos (gorillas) with their poisoned arrows" (quoted in Ravenstein 1901:59). Joiris reports that BaKola/BaGyeli women of western Cameroon hunt with nets, spears, and dogs and hunt with other women or their husbands: "Nowadays, BaGyeli women usually take an active part in some types of hunt. They participate not only in the net-hunt but also in stalking, either in groups of women or with men. Moreover, it is not unknown for a woman to use her husband's spear, in order to hunt small, medium and even large game. In a similar vein, women have also taken up trapping" (1994: 93). Baka women of eastern Cameroon, on the other hand, seldom hunt, but women will carry spears on their husbands' snare hunts, and some women are known to be more efficient spear hunters than men. Women do not own spears but will use ones belonging to their brothers, husbands, or fathers (Daou V. Joiris, personal communication, 1999).

Tanno (1976:114) observed 15 net-hunts among the Mbuti of the Ituri, noting that the net-hunt with the fewest women had the lowest return rate. On that day, only one woman and 12 men participated because the Mbuti had recently moved to a new camp and most women had remained in camp to build the new houses. He also reports that net-hunts did not take place on certain days because the women were too tired.

Observations of women net-hunting without men have been noted by several Aka ethnographers. Aka men in most areas go spear hunting at least part of the year, and during this period women do a sexually explicit dance called *sapa*, enticing the men to return. In the meantime women do not hesitate to go net-hunting on their own. Kitanishi reports that Aka "women also handle the nets and beat the bush, when there are not enough adult and adolescent men. Occasionally, women lead net-hunting when no adult man participates in the hunt" (1995:81). He also observed a situation in which women spear hunted: "It took place when the men had gone spear hunting for several days *(njango)*. A woman encountered a bush pig near the camp, and the women at the camp chased it with spears" (1995:89). McCreedy also describes the importance of women in the net-hunt when she quotes an Aka man: "Women are the arms of the dibouka [throw of the nets]" (1994:15). The Aka with whom she lived conducted a *bobanda* ritual when net-hunting was not successful. Men organized the ritual and pleaded with women to participate because women's enthusiasm and energy were viewed as crucial to the success of the ritual and future net-hunting.

While considerable variability exists in the frequency of central African forager women hunting, none of the groups seems to have sanctions against women hunters. It is important for both men and women to know a diversity of subsistence techniques so that men can take over general female activities and vice versa in case of necessity. As anthropologists have tried to explain the sexual division of labor, they have probably also contributed to a perception of fixed activities by sex when in fact considerable flexibility exists in these activities, especially among foraging peoples.

Aka Foragers: Net-Hunting, Sharing, and Gender Relations

About 20,000 Aka foragers live in the tropical forests of southern Central African Republic and northern Congo-Brazzaville. While enormous diversity exists among Aka groups in their reliance on farming, levels of acculturation, relationships with farmers, frequency of net-hunting, impact of commercial meat trade, and so on, the basic organization of net-hunts is remarkably similar. Researchers have described Aka net-hunts in several locations, and there are several ways to organize a net-hunt, but the following description is common to all Aka and is the type most frequently practiced (Bahuchet 1975, 1979, 1985; Delobeau 1989; Demesse 1978, 1980; Hewlett 1977, 1991; Hudson 1990; Kitanishi 1996; Motte 1982; Noss 1995; Takeuchi 1995). Hunters form a circle or semicircle with the nets, hanging the nets on small trees or vines, pegging the bottom of the net to the ground. Upon completing the circle or semicircle, the net carriers (usually males) begin searching the interior, beating leaves and shouting to drive animals from their hiding places. Often one or more men with spears also search the interior. The other participants (usually females) remain hidden near the nets to spot flushed animals, frighten them into the nets, and then seize them before they escape. Animals captured in nets are killed with machetes or logs lying nearby. The hunters quickly determine that no animals are inside the circle or that what is there has escaped or been captured. They then gather up the nets, move on to the next spot only a couple hundred meters away, and begin again.

Aka gender roles on the net-hunt are distinct from those among the Mbuti net-hunters in the eastern Congo Basin (Ituri Forest), where women always beat and flush out game while men guard the nets and capture animals (Harako 1976; Ichikawa 1983; Tanno 1976; Turnbull 1961; Wilkie and Curran 1991). Aka women are generally responsible for carrying the meat, tending children, and gathering additional food items, but men are active in all of these areas as well. Women assist with setting up and removing the nets and play the essential role of guarding the nets while the men are beating. Many animals outside the net circle are sighted first by a woman, who calls those

nearest her to set up their nets to encircle the animal or to attempt to spear it. However, Aka gender roles are interchangeable, as some women own nets (26 percent in this study) and women who do not own nets often borrow their husbands' or other men's nets when those individuals do not participate in the hunt. In addition, nets often change hands during a hunt. For example, after carrying the net for several sets, a man will pass the net on to his wife for the remainder of the hunt. Women also participate in beating, though they tend to be quieter and less active than men. Learning how to net-hunt comes early, and studies have demonstrated that boys and girls by age ten know how to chase various game animals into the net, butcher animals, and divide animals according to formal rules (Hewlett and Cavalli Sforza 1988).

Although not a central part of this study, it is important to briefly describe sharing of game animals captured on an Aka net-hunt (Bahuchet 1991; Hewlett 1991; Kitanishi 1996, 1998). The owner of a captured animal *(konja)* is the owner of the net. Konja are usually men, but, as mentioned above, one-fourth of the nets in Mossapoula are owned by women. Sharing of the game occurs in three stages: (1) the animal is usually butchered by the wife of the konja and is formally distributed to people with specific roles on the hunt—for example, the head of the animal goes to the person who set up the net, and the rib and belly go to the person who first seized the animal; (2) the woman who butchers the animal informally distributes pieces of meat to one to three (or more if it is a larger animal) adults on the hunt; and (3) the men with meat from the first or second distribution give the meat to their wives or female relatives, and they prepare stews that are then divided into bowls for each of the other huts in the camp (or camp subgroup if the camp is large). Kitanishi (1998:18) systematically evaluated all stages of sharing and reports that only 20 percent of a stew cooked by a woman was eaten by her family. Most of the stew women and their children ate was from other women unless the amount of stew was very small, in which case sharing was minimal. Because net owners (usually male) were not involved in the sharing and receivers of meat were women, the game hunted was shared only among women. Meat brought back to camp was redistributed among women who were present. Kitanishi demonstrates that kinship distance is not a good predictor of the frequency of Aka sharing in stages 1 and 2, but it is a better predictor in stage 3—that is, women cooking the stews were more likely to share with women who were biological kin. When camps were small and returns good, all women shared with all other women, but as camp size increased, women were more likely to share with kin and those in their subgroups. Both meat and vegetables were widely shared between women (Kitanishi 1998:19–20). Aka sharing is somewhat different from that among Mbuti: an Aka woman frequently shares the pot of stew with women in all other huts in camp (or the subgroup in larger camps), whereas Mbuti women share with men in a central hut and a few other women.

Finally, it is important to mention a few aspects of gender relations among the Aka. The Aka are probably one of the most gender-egalitarian cultures in the ethnographic record. Husband and wife share subsistence, child care, leisure, and ritual activities. Women participate in several types of hunts and are not forbidden from carrying or touching hunting implements such as nets, spears, machetes, crossbows, guns, or small traps. In terms of child care, Aka fathers provide more direct care of infants and young children than fathers in any other culture. Although men usually hold the named positions of *kombeti* (leader), *tuma* (elephant hunter), and *nganga* (healer), women challenge men's authority on a regular basis and are influential actors in all kinds of decision making (e.g., camp movement, extramarital affairs, bad luck on the hunt). Divorce is a matter of one partner moving out of the house. Physical violence in general is infrequent, and violence against women is especially rare. Hitting a child or a spouse is cause for divorce (Hewlett 1991).

The Mossapoula Aka

Most of the ethnographic studies of Aka net-hunting mentioned above were conducted in small communities, generally of 50 inhabitants or less, with hunting-gathering subsistence economies. This article examines a much larger Aka community, Mossapoula (300 inhabitants), in an economy in which hunting and gathering has declined in importance relative to a variety of agricultural and wage-labor opportunities.

Before a Yugoslavian lumber company opened in 1971, the Mossapoula Aka lived next to the Kaka fishing village of Mbinjo, which is now Bayanga. By the early 1980s most of the Aka had moved to the small dirt airstrip and worked for the logging company. They moved five kilometers north of Bayanga to their present location at Mossapoula in the mid-1980s because of problems with the increasing population of non-Aka residents. The non-Aka population increased because of perceptions of job opportunities with the logging company and conservation agencies (nongovernmental organizations such as the World Wildlife Fund). As the population increased, competition over land for manioc fields increased and the demand for Aka labor and forest products increased. The five-kilometer distance meant less harassment from villagers. Some of their Kaka patrons moved with them, and Mossapoula eventually included some 80 Kaka residents across the road from the Aka, but traditional ties with Kaka were weak, and Aka were no longer obliged to give Kaka a proportion of their game.

The first author, Noss, collected the data from September 1993 to December 1994 in the village of Mossapoula, within the Dzanga-Sangha Special Reserve of southwestern

Central African Republic (Figure 1). Data were collected to evaluate the impact of Aka subsistence activities on the new reserve. During week-long periods (Monday– Friday), for a total of 90 observation days, the principal daily activity was recorded for each adult and adolescent resident: 126 females and 116 males. In analyzing individual activity patterns, a subsample of those whose activities were tracked for at least 60 of the 90 observation days was defined: 113 females and 99 males. Households were defined as all adults and children sleeping in a single house.

In order to observe hunting activities, Noss accompanied 76 net-hunts: 58 during the 90 observation days, 10 on other days, and 8 net-hunts from forest camps. All hunts on observation days were accompanied, except in a few instances when more than one group went hunting, in which case the larger group was observed. Daily activities for each individual were recorded during the day as the person was observed or in the evening upon returning to the community. Aka ages were determined by A. Kretsinger (personal communication, 1993), director of the conservation agency's community health program that had served Mossapoula for five years.

All captured animals were weighed. Potential yields in kilograms of edible meat assumed that 60 percent of the live weight was edible and that all meat was consumed in Mossapoula. Approximately 80 percent of meat from net-hunts was consumed in Mossapoula, and 20 percent was sold or traded to merchants from Bayanga (Noss 1995). It

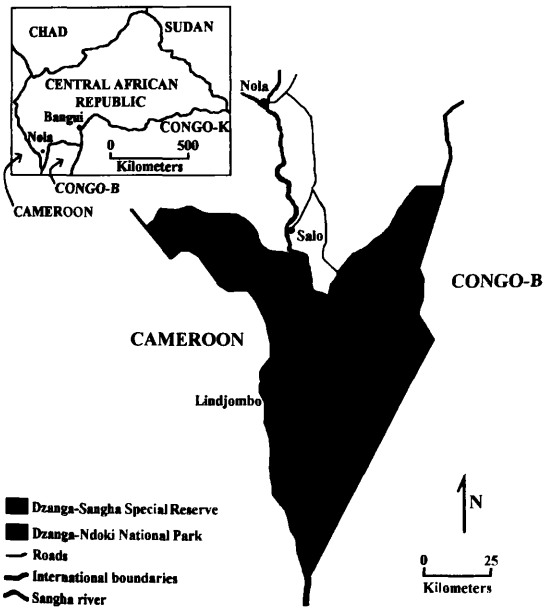


Figure 1. Dzanga-Sangha National Park and Special Reserve (from Noss 1997).

was impossible to determine actual sharing and consumption by individuals because meat was divided and distributed during the course of each hunt and again upon returning to Mossapoula before and after cooking.

Five kilometers to the south of Mossapoula is the town of Bayanga, which houses 2,500 residents, a French logging company sawmill, and the headquarters of a U.S.-based conservation agency that administers the Dzanga-Sangha Special Reserve and Dzanga-Ndoki National Park. Aka tend to view logging and conservation facilities as alternative clusters of "resources," and consequently the number of Aka in Mossapoula has slowly increased over time as Aka from Congo move in next to their Aka relatives in Mossapoula. Aka were drawn to rubber and coffee plantations during the colonial period, and more recently they have been attracted to conservation facilities or other neocolonial structures (e.g., logging companies, missions, nongovernmental organizations).

Results

A Quantitative Overview of Mossapoula Net-Hunting

Traditionally hunter-gatherers, the Mossapoula Aka during the study period engaged in a variety of subsistence and economic activities including hunting, gathering, fishing, farming, mining, day labor, and formal employment. Despite numerous alternatives, hunting remains economically important in providing food and income for the Mossapoula Aka (Noss 1997, 2000). Mossapoula Aka employ several hunting methods: community net-hunts, stalking with crossbow or gun, and the setting of snares. Of these methods, communal net-hunting is the most important in terms of yields and participation rates, and it is the only hunting method practiced by Mossapoula Aka women (Noss 1995). Unlike Aka women in other locations, Mossapoula women did not accompany men for crossbow and small trap hunting.

Net-hunts included an average of 45.6 participants, but participation ranged from 5 to 99 individuals. Net-hunts began anywhere from five minutes (200 meters) to over two hours (10 kilometers) from Mossapoula. Net-hunts took place on average one hour's walk and 3.8 kilometers from the village. Mossapoula hunters formed a circle with 4 to 20 nets (14 nets on average), and nets measured 5–40 meters in length, averaging 18.3 meters, and 1–1.5 meters in height. With an average of 16 casts per hunt, 14 nets per hunt, and 18 meters per net, the diameter of the net circle of nets was estimated to be 90 meters. Mossapoula Aka covered approximately 11–13 kilometers on an average net-hunt. The hunters completed the entire cycle of setting up the nets, beating, and moving to the next site in only 10–15 minutes. Thus, each net-hunt comprised four–six casts per hour, and hunts lasted about six hours (including time

walking to and from hunt), for a total of 10–30 casts in one day (average 16).

The net-hunt was primarily a hunt for the blue duiker *Cephalophus monticola* (= 6 kilograms), which constituted 75 percent of captures. The three other primary prey species were the brush-tailed porcupine *Atherurus africanus* (= 4 kilograms), the bay duiker *Cephalophus dorsalis* (= 25 kilograms), and the Peters' duiker *Cephalophus callipygus* (= 22 kilograms). Together these four species made up 97 percent of net-hunt captures. Larger animals were rarely encountered, in part because they were driven away by the noise of the net-hunting group moving through the forest. In any case, large animals including bay and Peters' duikers often tear through the nets or jump over them to escape (Noss 1998, 2000).

Only 7 percent (5 out of 76) of the hunts were unsuccessful. The average number of animals captured was seven. With 14 nets on average on the hunts this means that approximately 50 percent of families captured something every net-hunt.

Table 1 compares some of the features of Mossapoula Aka net-hunting with features of net-hunting among other Aka groups in northern Congo-Brazzaville and Mbuti groups in the Ituri (Congo-Kinshasa). Mossapoula Aka net-hunts were distinct in several ways: (1) nets were very small, (2) hunters made substantially more casts of the nets during the relatively short net-hunt, (3) more people participated on the hunt, (4) most of the participants were women, (5) net-hunts were relatively infrequent, and (6) return rates were relatively high. The Mossapoula return rates in Table 1 are averages of all Mossapoula net-hunts; the returns were higher in the forest camps (2.23 kilograms/hunter) in comparison with net-hunts from the village of Mossapoula (0.92 kilograms/hunter).

The relatively high return rates were, in part, due to the relatively high abundance of game animals. There were 10–20 blue duikers, 1.2–2.0 bay duikers, 0.9–1.2 Peters' duikers, and 2.7–5.3 brush-tailed porcupines per square kilometer in the Mossapoula area (Noss 2000). Elephants *(Loxodonta africana cyclotis)* were observed on 14 percent of net-hunts, and gorillas *(Gorilla gorilla gorilla)* were observed on 6 percent of hunts. No other researchers have noted encountering large mammals on net-hunts on such a regular basis. While Mossapoula Aka net-hunts were distinct in several ways, they were similar to descriptions of net-hunts in other areas of the Congo Basin as follows: small-to-medium-sized duikers represented more than 90 percent of all captures, and someone on the hunt captured at least one animal on 90 percent or more of all hunts (i.e., the success rate of the group was close to 100 percent).

Female Participation

Women and men of all ages actively participated in net-hunting, with girls and boys as young as five years of age beginning to contribute. One woman hunted through her eighth month of pregnancy and resumed hunting one month after giving birth. Infants accompanied their mothers. The oldest active net-hunter was a great-grandmother more than 60 years old who frequently hunted with her own net.

Overall, women were much more likely to net-hunt than men were. Only 4 of 126 females (3 percent) in Mossapoula did not net-hunt during the entire observation period, compared with 12 of 116 males (10 percent) who never hunted (chi-square = 5.17, $p < .05$). Women also outnumbered men on net-hunts (Table 1) even though the adult male–female sex ratio in the village was near equity (92:100). Figure 2 demonstrates that women across the life span net-hunted significantly more frequently than men. On occasion (two hunts), the net-hunting groups comprised only women. The only net-hunts in which women did not participate were the net-hunts staged for tourists visiting the Dzanga-Sangha Special Reserve. "Tourist hunts" were opportunities to earn cash, for tourists paid a $10 fee to the group whether or not anything was caught. Tourists would hire a small group of 10–15 hunters, and young men more interested in cash than in obtaining food items were the first to volunteer for this opportunity. It is also possible that the tourists and their park guides assumed that young men were the best or even the only net-hunters.

Women's participation in net-hunting also determined whether net-hunting took place at all. No net-hunts took place on 32 of 90 observation days (36 percent). Second to rain, the most important excuse given by the community for not net-hunting was that "the women have all gone into the forest" to gather mushrooms or caterpillars or to fish. From the community's perspective, women's participation was essential for net-hunting whereas men's participation was not.

Figure 3 shows a significant relationship between husbands' and wives' participation ($r^2 = 0.28$, $p = .01$) but does not necessarily indicate that the husband and wife hunted together or that one spouse caused the other spouse

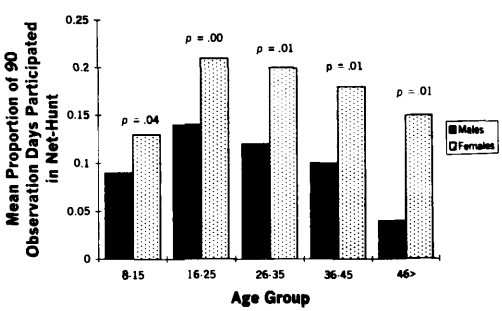


Figure 2. Proportion of days men and women in five age groups net-hunted.

Table 1. A comparative study of net-hunting among Congo Basin foragers.

Net-Hunting Group Location	Size of Nets	Mean Number of Casts	Mean Length of Net-Hunt	Mean Number of Participants	Percentage of Days Net-Hunting	Male:Female Ratio on Net-Hunting	Mean Number of Nets on Hunt	Percentage of Net-Hunting Meat Traded	Mean Yields (Total Biomass)	References
Aka (Mossapoula)	Mean = 18.3m; Range = 5–40m	16.5	6 hr 35 min	45.6	12	60:100	14.0	20	41.9 kg/day; .92 kg/hunter/day	Noss 1995
Aka (Moumpoutou-Ibenga)	Mean = 45.1m; Range = 24.5–70m	4.2	8 hr 16 min	44.3	62	135:100	16.5	0	37.7 kg/day; .85 kg/hunter/day	Takeuchi (personal communication)
Aka (Linganga-Makaou)	Mean = 30m			25.8	16		6.0	0	11.6 kg/day; .45 kg/hunter/day	Kitanishi 1995
Mbuti (Mawambo)	Mean = 80m; Range = 40–100m	7.0	7 hr 28 min						63.3 kg/day; 1.1 kg/camp resident/day	Tanno 1976
Mbuti (Lolwa)	Range = 50–100m	7.3	8 hr 12 min	19.9	59–84	89:100			15.9 kg/day; .80 kg/hunter/day	Harako 1981
Mbuti (Biasiko)		3.7	6 hr 12 min		69			47	18.1 kg/day; .74 kg/camp resident/day	Hart 1978
Mbuti (Tetri)	Mean = 63.5m	7.7	7 hr 20 min	17.0	93	163:100	10.0	46	35.8 kg/day; 2.1 kg/ hunter/day	Ichikawa 1983

to hunt. Of 25 days on which one or both members of a couple participated in a net-hunt, the wife participated alone 49 percent of the time, the husband participated alone 16 percent of the time, and the couple participated together 35 percent of the time.

Time allocation studies are another way to evaluate female versus male participation in net-hunting. Individuals' daily activities were recorded for a total of 19,656 total person days. Activities were categorized as follows: in or near the village of Mossapoula, on a net-hunt, engaged in formal labor, engaged in day labor, in forest camp, and absent. Individuals who stayed in Mossapoula performed a variety of tasks including farming, child care, fishing, gathering, tapping raffia wine, and making raffia roof shingles. Formal labor included employment with researchers, the U.S.-based conservation agency, the logging company based in Bayanga, a European filmmaker, and a World Bank forestry survey team. Only the filmmaker hired women, although several entire families established a camp near the logging operation's field site where the men were employed. Day labor for local residents of other ethnic groups was performed by women and men. Women generally worked in manioc fields or on coffee plantations, receiving payment in kind. Men sought payment in cash for clearing fields; collecting palm nuts, palm wine, raffia leaves, rattan, or construction poles; hunting with guns; and portering in the diamond fields. Mossapoula residents also established several temporary forest hunting camps 10–25 kilometers to the east of Mossapoula. Finally, individuals and families frequently moved to other Aka communities on a temporary basis.

Table 2. Mossapoula Aka time allocation by sex.

	Women		Men		
Activity	Mean Percentage of Time	SE	Mean Percentage of Time	SE	*T* between Sexes
Mossapoula	45.5	19.0	40.0	22.4	1.84
Net-hunt	18.1	11.0	11.6	8.7	4.73*
Day labor	11.3	7.6	7.0	10.1	3.50*
Formal labor	5.5	11.9	24.2	22.0	−7.82*
Forest camp	3.2	5.4	3.2	5.0	0.04
Absent	14/4	23.4	11.6	23.4	0.86
Total	98.0		97.4		

Note: $N = 90$ on observation days. Columns do not total 100 percent because not all individuals were on the records list for the full 90-day observation period.

* $p < .01$.

Table 2 summarizes male and female time allocation data and indicates that the most important activity for women outside the community was net-hunting, to which they devoted 18 percent of their time. Men, by contrast, devoted significantly less time, 11 percent, to net-hunting ($t = 4.69$, $p < 0.01$). The most active net-hunter was a woman who hunted on 43 percent of observation days, while the most active male participated in net-hunts on 32 percent of observation days. The woman hunter was a 40 year old with grown children. Her husband was the indisputable

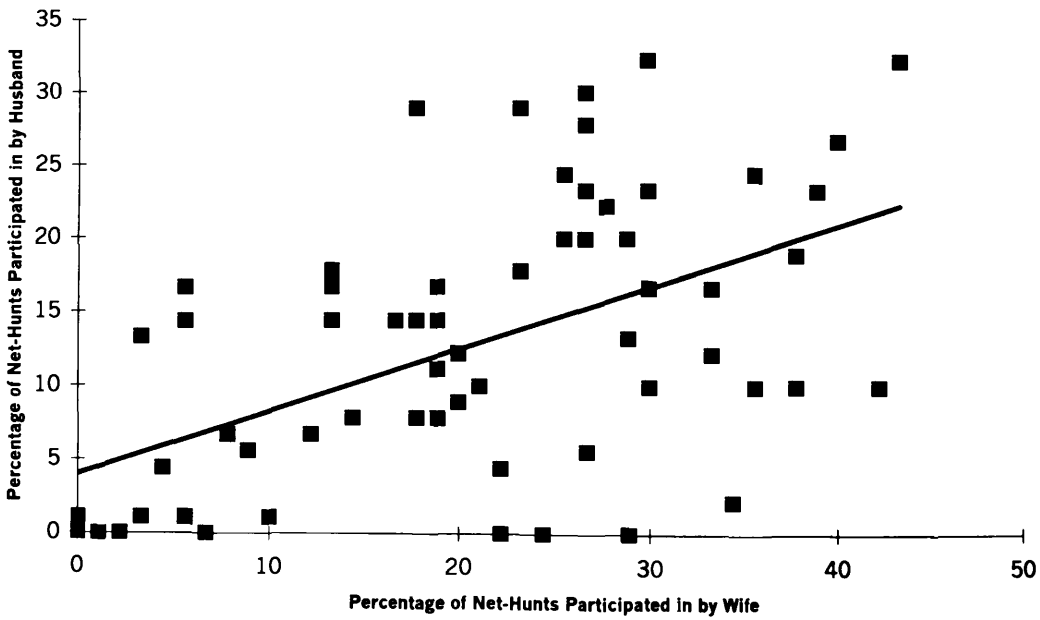


Figure 3. Relationship between percentage of net-hunts participated in by husband and wife.

leader of the net-hunt whenever he participated and also the leader (kombeti) of more than one forest camp. She frequently hunted in his absence with his net, which at 33 meters was the longest (and heaviest!) net in the village.

Female Yields

It is difficult to determine yields by gender, as both men and women may participate in captures. Men were usually considered the owners of the nets and game animals captured in the nets even though women were usually the ones to seize the animals in the nets. One way to estimate returns by gender is to examine net-hunt returns in relation to the proportion of female versus male participation on a hunt. Do returns increase if more females participate? Figure 4 indicates no statistical relationship between female participation and return rate. But the figure does suggest some patterns: Table 3 compares net-hunts in which males or females represented 60 percent or more of the participants. It demonstrates that return rates were higher when women rather than men predominated. A possible complicating factor is that the average size of the predominately female hunting group was 43.3 while the average size of the predominately male hunting group was 26.5, but no statistically significant relationship exists between number of participants and return rates. On the nine most successful net-hunts (> 2.5 kilograms/hunter), the average size of the net-hunting group was 22.6; on six of these hunts females represented over 60 percent of the participants and the average group size was an especially small 17.8. These hunts also took place from a forest camp ten kilometers from the village where the camp size was smaller and game was more abundant. But Figure 4 also demonstrates that net-hunts are not very successful when few males participate—some of the least successful hunts were when more than 85 percent of the participants were women. Overall, net-hunts are most successful when women and men complement each other.

In addition to the four primary game species exploited by net-hunters (blue duikers, bay duikers, Peters' duikers, brush-tailed porcupines), women captured one python (*Python sebae*) weighing 15 kilograms and measuring over

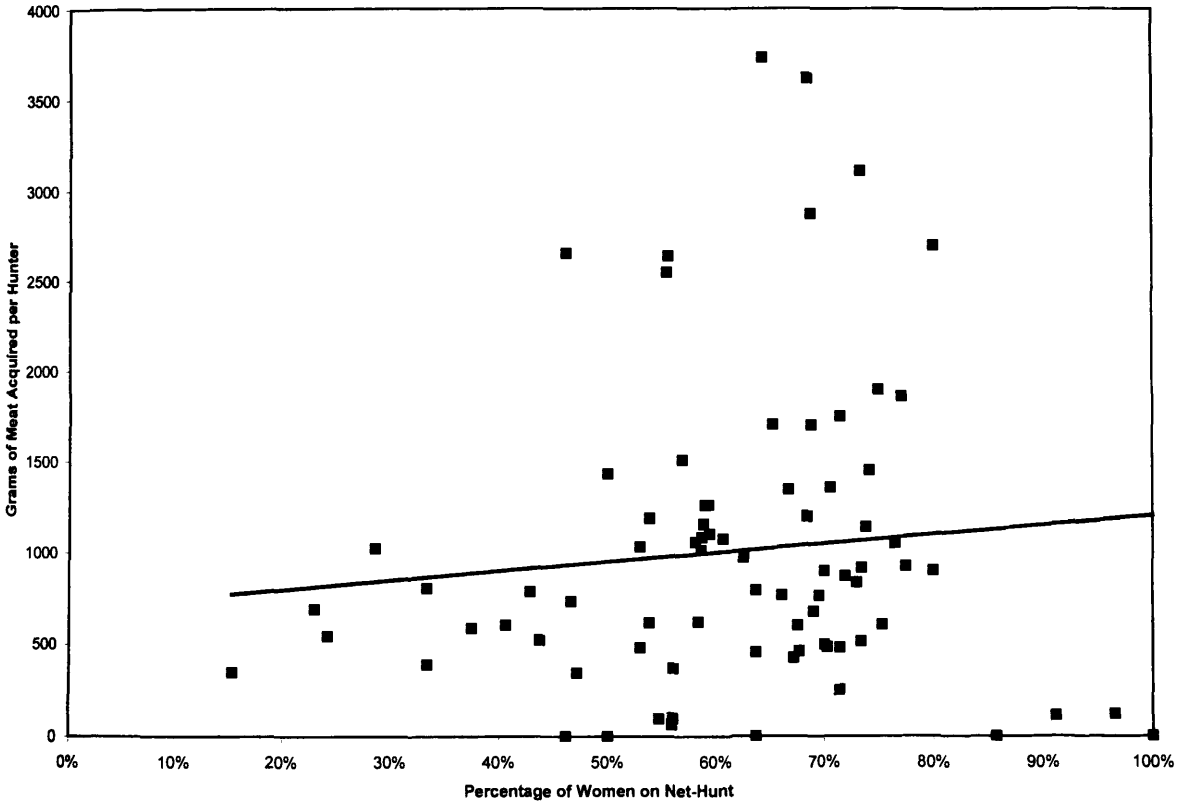


Figure 4. Relationship between percentage of women on net-hunt and total yield in grams per hunter.

Table 3. Differences in returns when there are more males or females on a net-hunt.

	More than 60% of Net-Hunt Participants Are Female	More than 60% of Net-Hunt Participants Are Male
Mean grams/hunter	1114.3	623.4
s.d.	925.3	219.1
Number of hunts	43	8
d.f.	46	
t	3.05	
p (two-tailed)	.004	

three meters in length, one long-nosed mongoose *(Herpestes naso)*, and three tortoises *(Kinixys erosa)*.

The calculations of net-hunt returns as grams of meat per hunter ignore the wide range of other forest products for consumption or sale that were collected during the hunt in addition to game, returns that were not quantified. Food items other than honey were gathered principally by women and likely tended to exceed the caloric and protein value of game meat obtained: *payo (Irvingia excelsa)* and other nuts, caterpillars, mushrooms, *koko* leaves *(Gnetum buchholzianum)*, fruit, and wild yams (*Dioscorea* spp.). Women as well as men gathered additional forest products for sale or domestic use: *kosa (Manniophyton fulvum)* bark strips for making cord and nets, *ngongo (Megaphrynium macrostachyum)* leaves for wrapping food or roofing huts, and rattan (*Eremospatha* sp. and *Ancistrophyllum secundiflorum*) (Noss 1995, 1997).

Decisions, Contexts, and Synthesis

Economic Alternatives

If women are interested in providing on a daily basis, as evolutionary theory suggests, why did women not dedicate themselves to farming or helping other village women with their fields? These activities are generally more reliable and efficient than hunting (Hames 1989) and are often the preference that Aka women demonstrate in more "traditional"/undeveloped areas. The Mossapoula study was not undertaken to evaluate trade-offs of alternative subsistence activities, so data to calculate return rates for each alternative activity were not collected, but it is possible to qualitatively evaluate other options. First, productivity of farming in the area was lowered by frequent losses to crop-raiding elephants. Second, in a community the size of Mossapoula, Aka farmers faced significant losses to other Aka community members who took with or without permission (Sarno 1998). When it was time to harvest a product, all the relatives showed up and expected shares. Finally, farming sometimes meant competing with horticulturalists for relatively limited lands available for farming because the national park and reserve prohibit farming more than 500 meters from the main road (Renner 1998). Access to farmland was unequal because villagers perceived the Aka as "primitive" and sometimes took over fields after Aka had cleared them.

Why didn't Aka females provide more day labor for villagers? As demonstrated in Table 2, this was a relatively important activity for Aka women, but because local horticulturalists viewed Aka as less than human, they often tried to exploit their labor. As Bayanga turned increasingly to a market economy, agricultural work as day laborers drew the Aka into relations that were frequently exploitative and sometimes abusive.

Why didn't females take up other small game hunting, such as hunting with *tobas* (small traps for mongoose and porcupine)? Cultural precedents influenced decision making, for "traditional" Aka females seldom hunted with tobas or other small game techniques in comparison to net-hunting. Also, individuals or small groups conducted other small game hunting. Women may have preferred to hunt in larger groups to deter the possibility of harassment or possible rape by men from other areas. Agta women also prefer to hunt in groups, whereas Agta men hunt individually (Estioko-Griffin 1986), and Matses and Aché women accompany their spouses (Hurtado et al. 1985; Romanoff 1983).

It is also important to consider cultural precedents in evaluating economic trade-offs. Cultural precedents are more than knowledge or experience. All Aka know how to farm and have had some experience farming either on their own or for villagers. However, very few Aka had fields. Females net-hunted, in part, because African forest forager women seem to have had a long history of hunting, and cultural precedents have social and emotional dimensions. Culture tends to make one feel that one's behaviors are universal and natural. For instance, we eat particular foods as children and then over time feel as if these are the best foods; we feel uncomfortable (even disgusted) if we are asked to eat a new food (i.e., caterpillars). One might call these food precedents. If one goes to a food market in a foreign country, one is likely to purchase foods based on these food precedents. Precedents regarding task allocation are cultural in that we tend to feel that members of one gender are better at a task than members of the other gender. Task allocation precedents influence subsistence decisions, in particular when individuals are undergoing change.

Contexts of Female Hunting

The data demonstrate the significance and efficiency of Mossapoula Aka women net-hunters. Mothers, grandmothers, and single and married women all participated in net-hunting. As previously stated, it is not surprising that women can hunt, but they do not do so in all contexts. Most of the contexts for female hunting predicted by the evolutionary

and cultural theoretical orientations occurred among the Mossapoula Aka: women received relatively high caloric returns from hunting (but we do not know precisely how this compares with that of other subsistence options), game animals were acquired synchronously, hunting took place with other adults, Aka women had access to the means/technology of efficient hunting, Aka male ideological/political control of women was minimal, and cultural precedents exist that have enabled women to obtain knowledge of and experience in hunting. We were unable to adequately evaluate the evolutionary prediction that women with infants net-hunt less frequently. We can only state that younger women (20–35 years old) net-hunted just as frequently as older adult women (36–65 years old), and it is more likely that the younger women had infants. This suggests that net-hunting may be more consistent with infant care compared with other hunting techniques (e.g., stalking). But Mossapoula Aka had smaller nets and did not hunt as long as net-hunters in other regions, which suggests that women may modify the technologies and methods so that they can carry an infant, basket, and net.

Although the contexts are consistent with theoretical predictions, it is not clear if the contexts are specific to Mossapoula Aka or if they apply to all Aka or all tropical forest net-hunters. Table 4 summarizes the generalizability of the various contexts that contribute to frequent female hunting. First (A in Table 4), it is important to point out that relatively greater gender equality and flexibility exist among mobile foragers than among farmers, pastoralists, and sedentary foragers whose resources are stored and defended (Lee 1998). For instance, African forest foragers acquired net-hunting technology from Bantu-speaking farmers (Vansina 1986), but women do not participate in farmers' net-hunts as they do among foragers. This may result from a general pattern of greater gender flexibility, but it is also probable that cultural precedents existed for women hunters before they adopted nets (e.g., the *mota* cooperative bow-and-arrow hunt among the Efe foragers [Bailey 1991]). In central Africa, farmers are much more likely than foragers to place female taboos on hunting technologies (e.g., nets, spears, crossbows, guns). Extensive sharing and cooperation in subsistence and child care are also central to understanding female hunting, and the frequency and scope of sharing are greater among foragers than they are among farmers (Kelly 1995; Lee 1998).

Second (B in Table 4), most contexts that predict female hunting are also found among other African forager net-hunters (in comparison to African foragers who use other hunting technologies such as bows and arrows or spears). Regular female participation in net-hunting, weak male control ideologies, low risk of net-hunt failure by the group, and the other items listed in the table are common to most African net-hunting forest foragers (Mbuti, Aka, Bakola/Bagyeli, and Bongo). A few contexts are specific to the Aka (C in Table 4)—the level of sharing and female control of the division and distribution of game. Female

Table 4. Cultural and environmental contexts of female hunting.

A. Contexts common to mobile foragers
1. Gender flexibility and versatility are relatively common.
2. Extensive sharing in child care and subsistence activities are relatively common.

B. Contexts common to most African forager net-hunters
1. Risk of net-hunt failure by the group is low.
2. Cooperation with other adults is common.
3. Most game animals are small or medium sized.
4. A cultural precedent exists for regular female participation in net-hunting which provides women with extensive knowledge of and experience with hunting.
5. Net-hunting is compatible with infant care (by comparison to spear or bow-and-arrow hunting of other African foragers).
6. Women have access to efficient hunting technology.
7. Male control ideologies are not as strong as among other forest foragers, in part because men and women cooperate in a broad range of subsistence and child care tasks.

C. Contexts common to most Aka foragers
1. Women control the division and distribution of game captured on net-hunts.
2. Sharing with other families appears to be more extensive than among other net-hunting groups.

D. Contexts specific to Mossapoula Aka
1. Nets are smaller and lighter than nets in other areas so they can be carried with an infant and/or basket.
2. Net-hunts do not last as long as net-hunts in other areas, but they are more intensive (i.e., more casts of nets).
3. Risk of failure by the individual or group is low. Game is relatively plentiful, and return rates are higher than in most other Aka and African forest forager groups.
4. The presence of a conservation agency, logging company, and filmmaker provide alternative resources and different cultural precedents regarding the division of labor.
5. Settlement size is large (300 individuals), so it is relatively easy to obtain enough individuals to net-hunt.

control of the division and distribution of their hunting efforts appears to be an important factor in understanding female hunting. If women do not control the distribution of game, they may be less interested in hunting. Data on the frequency and scope of sharing are limited, but the single systematic study of sharing among African forest foragers (Kitanishi 1996), together with descriptive accounts, suggests that the Aka share the animals captured on the net-hunt more widely than other forager net-hunters.

Finally (D in Table 4), several cultural and environmental contexts specific to the Mossapoula Aka contribute to the persistence of regular female hunting. Nets are smaller, net-hunts do not last very long, and success rates are relatively high by comparison to those of other net-hunting groups. Human population densities are low (< one person/square kilometer) (Carroll 1988), and hunting by non-Aka is restricted by park guards patrolling the national park and special reserve (Renner 1998).

The presence of a conservation agency, several scientific researchers, a logging company, and a filmmaker in the region also dramatically effect Mossapoula Aka decisions regarding hunting. The employers of these groups have cultural precedents regarding the sexual division of labor just as the Aka have cultural precedents. The employers are Euro-Americans or Western-trained Africans from farming families, and they usually hire Aka men as wage laborers because they view men as more appropriate for these positions. We do not know exactly why they prefer men (i.e., their gender ideologies), but cultural precedents for hiring men are apparent, as only men are hired by the logging company, scientists, and conservation agency. It is particularly interesting that only men are hired for tourist net-hunts. Only the filmmaker hired women because he wanted to film entire families. In summary, most contexts identified in Table 4 are consistent with evolutionary and cultural predictions, but a few contexts are seldom discussed in the literature: (1) modifications of net-hunting technology and hunt organization, (2) female control over the distribution of game, and (3) cultural precedents of those who hire wage laborers.

Critique and Synthesis of Evolutionary and Cultural Theories for the Sexual Division of Labor

Both evolutionary and cultural theories regarding forager sexual division of labor are useful in that they correctly predict several contexts of frequent female hunting among Mossapoula Aka. While the data are generally consistent with the theoretical predictions, the details of the Aka case question some of the assumptions of the theories and identify factors that contribute to a more precise understanding of both cultural and evolutionary predictions.

Evolutionary theory indicates that women are likely to hunt for synchronously acquired small or medium-sized game because they are more likely to be shared within the nuclear family than are large game. Aka women are more likely to hunt small and medium-sized synchronously acquired game as predicted, but they share the game extensively with others, in a way similar to that which the "show off" hypothesis predicts for big game–hunting males. Hawkes et al.'s (1997) evolutionary theory does not consider the method of acquiring game animals and assumes that most animals are captured by individual or small group methods familiar from among the Aché and Hadza. The theory also does not explain the extensive sharing of game found among the Aka. An evolutionist might predict that women have less to gain reproductively than men by "showing off" (i.e., extra matings) but may have a lot to gain in cooperation and friend making. Cooperative subsistence techniques also generally lead to more extensive sharing (Hames 1989). But it is also essential to consider cultural precedents for the distribution of game, for a long culture history exists among the Aka for dividing and distributing the game from net-hunts in this way. There is no indication that the Mossapoula Aka division of net-hunting returns is dramatically different from that of Aka in other areas where both men and women participate in net-hunting.

One of the cultural theories points out the importance of gender politics and taboos on women's use of efficient weapons, but the theory does not discuss the importance of female control in the distribution of game animals. The Aka data extend our understanding of the importance of female access to and control of resources. Friedl (1975) indicates that female access to meat resources explains variability in male dominance (i.e., male dominance increases as men's meat contribution to the diet increases) in foraging societies, but she utilizes reproductive reasons (i.e., the "babies as constraining" hypothesis) to explain why females do not hunt.

The Aka data question some of the assumptions of the evolutionary perspective and extend our understanding of one "cultural" perspective, but what is missing from the literature is any attempt to integrate these perspectives. Attempts to integrate disparate theoretical orientations are not popular because they seldom make anyone happy—each group tends to defend its turf—but we attempt to do so here because a synthesis seems to be an obvious step in theoretical development.

Integrating Evolutionary Approaches into Cultural Approaches

Brightman (1996) does an excellent job of evaluating the weaknesses of earlier "physiological" explanations for the sexual division of labor among foragers and demonstrates the importance of gender power relations for explaining why women do not hunt. His analysis, however, is limited because he does not attempt to explain *why* forager men in all parts of the world try to limit women's access to

the best hunting technologies. His explanations could be enhanced by incorporating recent theoretical contributions on the evolution of human patriarchy (Hrdy 1997; Smuts 1994). The recent work points out that in contrast to males in most nonhuman primate societies, human males tend to control both resources and political power. Smuts (1994: 24) identifies several factors that led to pronounced patriarchy in humans and that are rare in primates: patrilocality (most primates are female philopatric—females stay in home territory), male–male alliances for raiding of other males, male control over resources, increased hierarchy formation among men, and the evolution of language and its power to create male-biased ideologies. She also points out that female choice—females selecting men with more resources—reinforces male control over females. It is necessary to understand the evolutionary factors that have contributed to the development of human patriarchy if we are going to understand gender inequality and gender politics. Brightman's descriptions of gender inequality among foragers are consistent with the history of patriarchy outlined by the evolutionists; the latter extends his theory because it explains *why* most forager men try to control politics and hunting technology. The show off hypothesis also suggests that hunting is important to a forager man's ability to attract mates, so it makes evolutionary sense that controlling hunting technology would be especially important to men.

Integrating Cultural Approaches into Evolutionary Approaches

While feminist evolutionists have examined the developmental history of patriarchy, human behavioral ecologists have not incorporated this work or Brightman's research on gender power relations into their explanatory models of the sexual division of labor. HBE points out that men and women have different reproductive trade-offs in gender allocation of labor, but it does not address gender differences in political power and access to technology. Bird (1999) notes that existing HBE studies explain female variability in time allocation of food production according to reproductive status, but HBE does not explain the differences in the resource choices of men and women. Incorporating gender power relations into HBE would enhance our understanding of the contexts of female hunting (i.e., when male control is low). Male control of technology is another consequence of males' greater concern with and investment in mating effort.

Evolutionists also tend to ignore the concept of culture. From an HBE perspective, culture is simply another way humans adapt to their environments and it does not have particular properties of its own. Thus, Bird's (1999) summary and critique of the HBE literature on the forager sexual division of labor never mentions "culture." A cultural approach assumes otherwise—cultural precedents/schema are not assumed to be linked to reproductive interests and are more likely to result from relatively unique and arbitrary culture histories. For instance, in the New World forager men are more likely than forager women to contribute the majority of the calories to the diet, whereas in the Old World men and women are more likely to contribute equally or women contribute more than men (Hewlett n.d.). This suggests that gender task allocation is linked to particular culture histories rather than different natural environments: peoples that migrated into the Americas emphasized and had cultural precedents for male hunting. If we are to understand the contexts of the sexual division of labor in a particular area, it is necessary to understand the culture history of task allocation (i.e., cultural precedents) in the group and the region.

In many instances the absence or presence of cultural precedents is consistent with evolutionary predictions. For instance, cultural precedents do not exist for female big game hunting, and this is consistent with the show off hypothesis. The cultural precedent for female net-hunting is also consistent with evolutionary predictions, as yields are high. This is what one might expect, for culture is often characterized as being "adaptive." But cultural precedents influence subsistence decisions in ways that are not predicted by evolutionary hypotheses. For instance, the cultural precedent for Aka female net-hunting makes it a viable subsistence option in a rapidly changing environment, whereas Baka forest forager women 500 meters away on the other side of the Sangha River do not hunt for small or medium-sized game because they lack the cultural precedents. As social-economic conditions change, Baka women increase the amount of day labor they provide to village women. Also, game is abundant in the Bayanga area, and net-hunting is not particularly difficult to learn, but women from the other resident ethnic groups do not net-hunt on their own or with Aka women because cultural precedents guide their decisions. Finally, cultural precedents pattern how one feels about performing particular subsistence activities, and it is clear that one reason Aka women hunt is that they feel comfortable doing so.

It is worth noting that it will be difficult to distinguish evolutionary and cultural explanations. For instance, why do Aka men rather than women occupy most of the wage-labor positions? Evolutionists might hypothesize that Aka men are more interested in these positions because, like hunting large game animals, they attract status and show-off value. Men can bring in the "big bucks" rather than the big buck (Karen Lupo, personal communication, 1999). Formal positions are rare for anyone in the country, but especially for Aka because farmers tend to view them as primitive. The cash income allows men to purchase a variety of city goods, such as cloth, shoes, radios, and knives as well as Western medicines, canned foods, and alcohol. Paychecks are similar to large game animal captures in that

they are utilized by many people within a day or so. The "cultural" ethnographic decision makers, on the other hand, would argue that Aka men obtain these positions because the people hiring the Aka have their own cultural precedents regarding the sexual division of labor, which usually favors males. Detailed and systematic research is needed to distinguish evolutionary and cultural predictions.

Synthesis

An understanding of the contexts of female hunting is clearly linked to understanding both evolutionary and cultural factors related to the sexual division of labor among foragers. The Aka data presented in this article and the limited review of the evolutionary and cultural perspectives suggest that the following four factors are especially important for understanding female hunting and the sexual division of labor among foragers:

1. differential male and female reproductive strategies
2. male control ideologies and level of patriarchy
3. culture history and precedents for female hunting
4. social and natural environments

The first factor is "biological" (i.e., genetic) and part of our mammalian heritage. Males and females have different reproductive interests and strategies: males concentrate time and energy in mating effort rather than parenting effort, while females concentrate more time and energy in parenting rather than mating effort. The second and third are "cultural" (i.e., symbolic and transmitted nonbiologically from generation to generation), while the fourth emphasizes the site-specific characteristics of the natural (e.g., availability, size, and quality of game; seasonality) and social (e.g., number and types of neighbors, demographic features of the group and their neighbors, ideologies of neighbors) environments. The four factors are not freestanding, and they interact and influence each other. For instance, differential male and female reproductive strategies contribute to male control ideologies, and those ideologies in turn influence the establishment of cultural precedents in the sexual division of labor. This does not mean that everything "cultural" flows from reproductive strategies. Cultural precedents may be arbitrary and have a history of their own as suggested in the cultural histories of hunting with a net versus hunting with a bow. The social and natural environment is a very large and complex group of factors that can influence the level of male control ideologies or the persistence or change of cultural precedents. The identification of these four factors underlines the importance of understanding biological, cultural, and environmental factors if one seeks to explain female hunting or forager gender task allocation.

Conclusion

This study has contributed to ethnography and theory regarding the sexual division of labor among foragers. The study (1) systematically documents a forager group in which women net-hunted more frequently than men, (2) identifies environmental and cultural contexts that contribute to frequent female hunting, (3) evaluates evolutionary and cultural predictions regarding the contexts of female hunting, (4) suggests modifications to both evolutionary and cultural theories that deal with female hunting and sexual division of labor among foragers, and (5) offers a synthesis of evolutionary and cultural approaches to the sexual division of labor.

Notes

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1. The Aka are also known as BaAka, BiAka, Bayaka, Ba-Benzele, and BaBinga.

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