Fishing and the Sexual Division of Labor among the Meriam

ABSTRACT  Do men and women forage differently because they are cooperatively responding to children's requirements for care or because they are differentially sensitive to variance? In this article, I examine how care trade-offs and variance contribute to gender differences in fishing strategies among Torres Strait Islanders (Meriam). Women's fishing had lower failure rates, coefficients of variation, and frequencies of sharing than men's fishing. Men and women responded to trade-offs between mean and variance differently: Women spent less time on high mean–high variance activities, men less time on high mean–low variance activities. Although child-care trade-offs affected time allocation to different fishing activities among women, they did not affect differences in time allocation between the sexes. These results support previous work implicating variance and sharing frequency as important resource currencies shaping gender differences in subsistence decisions, and they offer challenges to a general model of the division of labor predicated on economic notions of specialization as increasing production efficiency. [Keywords: Torres Strait, behavioral ecology, division of labor, fishing, food sharing]
dangerous to small children, or those in which productivity does not decline significantly when children are present (Brown 1970; Hurtado with Hill, Kaplan, and Hurtado 1992).

The second model focuses on the intersection between social interactions and local ecology, proposing that differential sensitivity to variance in resource acquisition shapes foraging preferences (Bird 1999; Hawkes 1990; Jochim 1988; Peacock 1991). Social and ecological contexts create benefits and opportunities for acquiring resources with different probabilities of success. Competitive regimes and opportunities for gaining social status through resource sharing bias some foragers (more often men) toward more variable resources, whereas those who gain greater benefits for actually consuming the resource or feeding dependent household members (more often women) do better with a strategy that minimizes variance in acquisition.

Both the variance model and the child-care constraints model have been proposed to explain the DOL among Ache hunter-gatherers. Kristen Hawkes (1990, 1991) demonstrated that the relative foraging effort of each sex could be predicted by the variance in harvest efficiency. Men’s preference for variance, she argued, was the outcome of preferences for unpredictably acquired resources that were subject to widespread sharing; likewise, Hawkes proposed that women’s aversion to variation was the outcome of preferences for resources that predictably met a nutritional threshold. Ana Magdalena Hurtado with colleagues (1992) examined the Ache DOL from a time allocation perspective. Their results suggested that the DOL was maintained by the trade-offs women faced between caring for children and feeding them, producing a cooperative “economy of scale” wherein males and females specialized in different resource types to optimize household production. Men preferred high variance resources because they offered (a) high child-care trade-offs to women and (b) larger harvests, which could be directed both to households and to the wider public arena.

These models identify three possible sources for gendered biases in foraging choices: variance, sharing, and child-care constraints. The models also make different predictions concerning the relationship between men’s and women’s foraging effort and child-care trade-offs. In this article, I draw on these models to propose some testable hypotheses to explain gender biases in Meriam men’s and women’s fishing decisions. Do women who must care for children prefer resources associated with low child-care trade-offs? Are the differences in fishing preferences between the sexes predicted by resource variance or child-care trade-offs? Do preferences for sharing affect gender-biased fishing decisions? Is sharing a function of harvest size or variance?

ETHNOGRAPHIC BACKGROUND AND METHODS

The Meriam Islands (Mer, Dauar, and Waier) are located on the northern Great Barrier Reef, 140 kilometers from New Guinea in Australia’s Torres Strait. Meriam peoples are culturally Melanesian, and historically they occupied a central role in trading networks reaching north to Highlands New Guinea and south to Aboriginal communities on the Cape York Peninsula. In 1998, there were 430 Meriam living in 84 households along the northwest foreshore of the main island, Mer. Until the mid-1970s, most Meriam relied extensively on subsistence gardening. Although horticulture has declined in importance today, marine fishing remains a vital component of Meriam social and economic life, particularly in the incorporation of fish, shellfish, and turtle into the public feasting cycle, which features elaborate funeral feasts and involves dancing, distribution, and display (Bliege Bird and Smith 2005; Smith with Bliege Bird 2000). ¹

Observations of Meriam marine fishing and food-sharing regimes were conducted over a period of 27 months between January 1993 and July 1999 specifically to examine the costs and benefits of the DOL and to determine the nature of the trade-offs affecting men’s and women’s fishing decisions. The data collected included: (1) time allocation to various fishing activities in three different marine habitats; (2) fishing efficiency and the frequency of sharing to another household; and (3) the effect of the presence of dependent children on women’s fishing efficiency and time allocation.

The marine environment contains three distinct fishing macropatches that usually define the boundaries of any fishing trip (foragers tend not to switch between patches during a single fishing trip). Macropatches are large-scale habitats within which there are several types of distinct prey patches and fishing activities characterized by mutually exclusive search (which I refer to as “fishing activities”). The fishing activities in each macropatch are associated with different levels of variance, different expected returns (sometimes), and different child-care compatibility. The patches are as follows: (1) intertidal, the exposed reef at low tide on the southwest end of the island; (2) beach, the sandy nearshore on the northeast end of the island, near the village; and (3) offshore, reefs and open water, accessed with open boats equipped with outboard motors. The analysis below considers the decisions men and women made about how to allocate their time to various subsistence fishing activities within each of the three fishing macropatches. Details on turtle hunting and sharing and demographics are presented elsewhere (Bird and Bliege Bird 1997; Bliege Bird and Bird 1997; Bliege Bird with Smith and Bird 2001; Bliege Bird with Kushnick, Bird, and Smith 2002).

Because Meriam clan- and patrilineage-based ownership of residential, gardening, and fishing territories is still intact and actively defended, and the beach and reef macropatches are small and highly visible from the shoreline, I employed a patch sampling scheme to collect data on time allocation and fishing efficiency. I randomly selected a two-hour observation period between 6:00 a.m. and 6:00 p.m. (very little fishing occurs at night) from March 1994 to March 1995 and monitored the time all individuals allocated to different fishing activities. I was able to observe
the entire length of the foreshore, including all patrilineal fishing territories by alternating my position during the sample period. This record resulted in 1,300 person-hours of observation on 96 women and 60 men over the age of 15. I use the record to calculate the proportion of time devoted to each fishing activity within the beach and intertidal macropatch, and to evaluate differences in time allocation to different fishing activities according to one's overall constraints and trade-offs (such as having more dependent children to feed). During this observation period, I also used focal individual follows (Altmann 1974) to record the activities of the first individual to arrive after the sample block had started, including time spent in travel to the patch, time spent in each fishing activity, and counts and weights of the individual's harvest at the end of the episode. The total focal follow sample used here includes 384 bouts, and it is used to calculate return rates, success rates, harvest sizes, sharing frequencies, the effect of children's presence, and the percentage of calories acquired by men and women.

To sample decisions about offshore fishing, I also incorporated the use of focal follows and direct observational techniques, but I was not able to select individuals randomly. I invited individuals to use my boat or accompanied them in theirs. Measures of return and time allocation to different fishing activities while offshore are derived from these ad lib samples. In addition to making systematic observations, I also interviewed 13 women and 18 men on issues related to the DOL, examined perceptions of men's work and social status of both men and women, and conducted a three-month survey of acquisition and sharing on eight households over 29 sample days.

Decisions about how much time to spend on different simultaneously available fishing activities within a macropatch are difficult to model because, generally, to predict what types of fishing activities people should choose, we need to know the average energetic return rates from fishing activities they did not choose, as well as other opportunity costs people face in deciding to exploit one patch or fishing activity over another. Because this is empirically difficult, a rough proxy model of patch choice is often used, which combines the standard assumption that foragers seek to maximize overall mean foraging return rates (Kaplan and Hill 1992) with the patch residence time predictions of the marginal value theorem (Charnov 1976) that foragers will switch fishing activities when returns fall below the marginal rate for the entire zone including travel to the next fishing location (Smith 1991). One prediction consistent with this model is that within a set of spatially and temporally congruent resources (foraging patch) all foragers should end up spending more time in the fishing activity with the highest return rate, and less time in other fishing activities, in an attempt to maximize total energetic return rates. Any departures from this pattern should indicate that foragers have other goals in mind (e.g., time minimization or threshold requirements) or are faced with constraints that prevent them from gaining high returns. As Richard Sosis (2002) points out, such a correlation is not a direct test of any patch choice model, but it offers a useful starting point to evaluate gender differences in time allocation to particular fishing activities.

One way to test for variance sensitivity is to experimentally present foragers with two or three simultaneous options: Usually, a forager chooses between prey types with similar mean returns but different variance. Here, I focus on fishing decisions in three macropatches (the beach, the reef, and offshore waters) and explore how males and females within each macropatch allocate their time among fishing activities. The child-care trade-offs model predicts that (1) men prefer (and women avoid) fishing activities with high child-care trade-offs; (2) foragers accompanied by small children will choose to spend more time in fishing activities associated with low child-care trade-offs; and (3) sharing is a function of harvest size, so that only large harvests have a portion directed to consumers other than one's own household. The variance sensitivity model predicts that (1) given equal rates of return, women will spend less time and men more time in the more variable fishing activities; and (2) men should spend more time, and women less time, on resources that are widely shared. The null hypothesis in this case states that if males and females are not sensitive to variance or to child-care constraints, and if they are attempting to maximize the rate of caloric gain, they should simply allocate their time within each macropatch according to expected rates of return. In the following section, I test these five predictions within each macropatch.

**RESULTS**

**Division of Labor in the Beach Macropatch**

The beach macropatch is located along the village foreshore within each patrilineage’s residential boundary, where the reef is more deeply submerged and a wider variety of fish are available. In the beach patch, there are three different fishing activities simultaneously available. Sardine netting (NET) involves casting a weighted circular hand net into schools of sardines along the foreshore. Small-hook fishing (SHF) targets small- to medium-sized reef fish using dough, small morsels of fish, or weed baits. Large-hook fishing (LHF) targets semipelagic and reef-dwelling piscivorous fish that forage intermittently along the nearshore. Foragers use a metal hook baited with whole or live sardine attached to a monofilament hand line.

**Null Hypothesis: Men and Women Allocate Their Time According to Energetic Rates of Return.** According to the null hypothesis, both men’s and women’s average time allocation to fishing activities within a patch should correspond to the average expected energetic return rate associated with each fishing activity. In the beach patch, the most efficient fishing activity (NET) yields ten times the efficiency of the two alternatives, SHF and LHF fishing (see Table 1). The sexes did not differ in their time allocation to NET, but they did differ significantly on the two lower-efficiency fishing activities. Men preferred to spend 62 percent of their
TABLE 1. Characteristics of fishing activities in three macropatches.

<table>
<thead>
<tr>
<th>Fishing Activity</th>
<th>% Macropatch Time</th>
<th>Mean Returns (Kcal/hr)</th>
<th>Coeff of Var (CV)</th>
<th>Success Rate</th>
<th>Mean Harvest Size (kcal)</th>
<th>Harvest Size Range</th>
<th>N</th>
<th>Sharing Freq</th>
<th>% kcal by F</th>
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<tr>
<td>NET</td>
<td>9</td>
<td>9</td>
<td>9810</td>
<td>.667</td>
<td>.94</td>
<td>2547</td>
<td>6602</td>
<td>27</td>
<td>.048</td>
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<tr>
<td>SHF</td>
<td>66a</td>
<td>15a</td>
<td>356b</td>
<td>1.300c</td>
<td>.755d</td>
<td>709</td>
<td>5874</td>
<td>101</td>
<td>.300</td>
</tr>
<tr>
<td>LHF</td>
<td>23a</td>
<td>62a</td>
<td>838b</td>
<td>1.761c</td>
<td>.489d</td>
<td>735</td>
<td>7525</td>
<td>87</td>
<td>.643</td>
</tr>
<tr>
<td>RFC</td>
<td>76a</td>
<td>31a</td>
<td>1492b</td>
<td>.796e</td>
<td>.001</td>
<td>1962</td>
<td>8268</td>
<td>47</td>
<td>.357</td>
</tr>
<tr>
<td>RSH</td>
<td>14a</td>
<td>4b</td>
<td>575</td>
<td>.441</td>
<td>.050</td>
<td>520</td>
<td>963</td>
<td>10</td>
<td>.140</td>
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<tr>
<td>RFS</td>
<td>9a</td>
<td>63a</td>
<td>328b</td>
<td>2.120c</td>
<td>.500</td>
<td>414</td>
<td>3280</td>
<td>29</td>
<td>.300</td>
</tr>
<tr>
<td>RTF</td>
<td>40a</td>
<td>8b</td>
<td>677</td>
<td>1.134c</td>
<td>.059</td>
<td>988</td>
<td>5279</td>
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<td>.201</td>
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<tr>
<td>RFC</td>
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<td>1348</td>
<td>.707</td>
<td>.120</td>
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<tr>
<td>TRM</td>
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<td>47a</td>
<td>2312</td>
<td>2.335c</td>
<td>.340</td>
<td>3076</td>
<td>26594</td>
<td>46</td>
<td>.850</td>
</tr>
</tbody>
</table>

a denotes means that are significantly different at $p < .001$ (t-test) between males and females in the same fishing activity.
b denotes means that are significantly different at $p < .001$ (Levene's test) between fishing activities in the same macropatch.
c denotes variances that are significantly different at $p < 0.05$.
d The odds of SHF success are increased 1.46 times with every additional 30 minutes spent fishing (logistic regression, odds ratio = 1.46 [per 30 minutes], $p = .0041$). There is no significant effect of time on success rate for LHF (odds ratio = .912, $p = .6898$).

Why Do Men Prefer Large Hook Fishing and Women Small Hook Fishing?

Prediction 1. Is LHF associated with a bigger loss to efficiency when children are present? I compared women’s return rates with and without children (0–5 years) present using an unpaired, small sample t-test, which showed no significant effect of a child’s presence on either SHF or LHF efficiency (see Table 2).

Prediction 2. Do women with strong child-care trade-offs choose to forage more often in SHF than LHF? I approached this question in two ways, one by measuring women’s immediate trade-offs (did they have a child aged 0–5 present while fishing?) and their overall trade-offs (the presence of young [aged 0–S] dependent children at home). If child-care tradeoffs affect how differently women forage from men, those women with children present or with many children at home should have higher costs for engaging in typically men’s fishing and should spend less time LHF compared to women foraging alone or with no dependent children at home. The results of this test are presented in Table 2. Women did not spend more time SHF when young children were present, and women with more young children at home allocated their time between fishing activities similarly to women with no dependent children.

Prediction 3. Is the likelihood of sharing a function of harvest size? To test this prediction, I incorporated the independent covariates harvest size (continuous) and the sex of the acquirer into a logistic regression model with a dichotomous dependent variable “Sharing Outcome” (1 = some or all of harvest given to another household, 0 = all kept within household of acquirer). Table 3 shows that the effects of harvest size on sharing are significant only for SHF, and not LHF. This suggests that LHF harvests are more likely to be shared regardless of harvest size, and that SHF harvests are shared between households only when harvests are larger.

Prediction 4. Are men’s choices biased toward (and women’s away from) the higher variance fishing activity? LHF has significantly higher efficiency and higher variance than SHF (see Table 1). LHF is also more variable in another way: Success rates for LHF (49 percent) are much lower than for SHF (75 percent). Success rates for SHF are also more predictable: The odds of success can be increased 1.46 times with every additional 30 minutes spent fishing. There is no significant effect of time on success rate for LHF.

Prediction 5. Are men’s choices biased toward (and women’s away from) fish that are more likely to be shared? In total, 64 percent of large-hook (18/28) and 30 percent of small-hook harvests (19/64) were shared to at least one other household. Table 4 shows that relative to small-hook fish, the odds of sharing a portion of harvest of large-hook fish are three times higher, controlling for harvest size and sex of the acquirer.

Division of Labor in the Intertidal Macropatch

The reef macropatch is located on the southwest (windward) side of the island, where the reef is shallow and broad, approximately a ten- to 20-minute walk from the village. Most intertidal reef activities take place during the six months of the year when the diurnal tides are lowest. The key fishing activities here are reef-flat collecting (RFC), reef spearfishing (RFS), and rocky-shore harvesting (RSH). RFC targets primarily large tridacnic clams and conch scattered across the reef; RFS targets reef fish in lagoons and at the reef edge; and RSH involves the search for sand bivalves and periwinkles in the upper intertidal. All three fishing activities occur in the same patch during the same conditions, during a two-hour window when the reef is exposed at low tide.

Null Hypothesis: Men and Women Allocate Their Time According to Energetic Rates of Return. The reef offers foragers the choice between taking a set of reliable, high efficiency prey (RFC); reliable, low efficiency prey (RSH); or unreliable, low efficiency prey (RFS). Here, men and women differ significantly in the time they allocate to the most...
relative odds between fishing activities, the odds ratios in Table 4 must be used. To compare the effects of increasing harvest size within a fishing activity, the odds ratios are not comparable between fishing activities. To compare the odds of sharing according to harvest size in kilocalories, we use the formula 

\[ \text{odds ratio} = \frac{e^{\beta \text{harvest size}}} {1 + e^{\beta \text{harvest size}}} \]

where \( \beta \) is the slope coefficient. Because these are independent models looking only at the effects of increasing harvest size within a fishing activity, the odds ratios are not comparable between fishing activities. To compare the odds of sharing a 1,000 kcal harvest compared to the odds of sharing a 10,000 kcal harvest, we can use the formula 

\[ \text{odds ratio} = e^{\beta \text{harvest size}} \]

where \( \beta \) is the slope coefficient. To calculate the odds of sharing a 1,000 kcal harvest compared to the odds of sharing a 10,000 kcal harvest, we can use the formula 

\[ \text{odds ratio} = e^{\beta \text{harvest size}} \]

where \( \beta \) is the slope coefficient. The odds ratios are not comparable between fishing activities. To compare the odds of sharing a 1,000 kcal harvest compared to the odds of sharing a 10,000 kcal harvest, we can use the formula 

\[ \text{odds ratio} = e^{\beta \text{harvest size}} \]

where \( \beta \) is the slope coefficient. The odds ratios are not comparable between fishing activities.


**a Odds ratios.** For continuous variables, odds ratios are given as the odds of sharing a one unit increment of the independent variable (here, a single kilocaloric [kcal]). To calculate the odds of sharing a 1,000 kcal harvest compared to the odds of sharing a 10,000 kcal harvest, we use the formula 

\[ \text{odds ratio} = e^{\beta \text{harvest size}} \]

where \( \beta \) is the slope coefficient. Because these are independent models looking only at the effects of increasing harvest size within a fishing activity, the odds ratios are not comparable between fishing activities. To compare the odds of sharing a 1,000 kcal harvest compared to the odds of sharing a 10,000 kcal harvest, we can use the formula 

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efficient fishing activity. As I report in Bliege Bird with colleagues (2001), men spend the majority of their reef time in the least efficient fishing activity (spearing), while women allocate their time according to long-term energetic rates of return, spending more time in RFC, an activity that provides three times higher efficiency than men’s spearing (see Table 1).

### Why Do Women Prefer Shellfishing and Men Prefer Spearfishing?

**Prediction 1.** Is RFS associated with a bigger loss to efficiency than RFC when children are present? Unfortunately, women so rarely went spearing that it was not possible to examine the effect of children on return rates. However, it is possible to examine the effects of children on RFC. When RFC foragers were accompanied by children under age five (7/34 bouts), they appeared to face rather strong trade-offs. They had significantly smaller harvests and experienced a 53-percent reduction in their collecting efficiency (see Table 2). Their harvest efficiency with children dropped so far that RSH was only marginally less efficient. RSH did not show any significant decline in efficiency with children's presence.

**Prediction 2.** Do women with stronger trade-offs spend more time in RFC? Women with stronger child-care trade-offs actually spent less time in RFC and more time RSH during the low tide (see Table 2). When young children were present, women spent half as much time RFC (48 percent) and twice as much time RSH (47 percent) as they did when their children were absent. Even though RFC returns declined by 53 percent with the presence of children, all women in the sample allocated their time among reef-fishing activities in the long term, according to the predictions of the patch choice model. Their decisions departed from the model only when small children were present and thus when their likely returns in both fishing activities were similar.

**Prediction 3.** Is sharing a function of harvest size? Table 3 shows that RFS is not more likely to be shared with increasing harvest size. RFC harvests are 55 times more likely to be shared at a five-kilogram harvest as compared to a one-kilogram harvest.

**Prediction 4.** Is RFS more variable than RFC? Table 1 shows that the coefficient of variation in mean returns for RFS is one-third that of spearing (0.796 vs. 2.12). Only 50 percent of RFS bouts are successful, whereas no RFC episode ever failed to acquire any meat.

**Prediction 5.** Are RFS harvests more likely to be shared? RFS does not produce harvests that are more likely to be shared. RFC produces harvests that are more than five times larger and that are more often shared: 36 percent are distributed to more than one household, compared to 30 percent of spearing harvests. However, given that RFC harvests are on average tiny compared to RFC harvests, they seem to be shared more often than expected.

### Division of Labor in the Offshore Macropatch

Offshore trips incorporate three different fishing activities: (1) reef-top fishing (RTF), targeting flooded nearshore reefs and focusing on small carnivorous reef fish like coral cod and sea perch; (2) reef-bottom diving (RBD), occurring at reef slopes and lagoon bottoms and targeting commercial species (spiny lobster, trochus, and coral trout); and (3) trolling at flooded reef margins (TRM), targeting large pelagic fish like Spanish mackerel and tuna. RBD is a commercial fishing activity (85 percent of a harvest is sold on average) in which few women (and only a small proportion of men) were currently participating; it is thus excluded from the analysis.

**Null Hypothesis: Men and Women Allocate Their Time According to Energetic Rates of Return.** TRM efficiency is three times higher than RTF, but because of the high exogenous variance, the difference is not statistically significant. Even so, there were significant gender differences in time allocation to TRM versus RTF. Women spent the majority of their total offshore time RTF, men in TRM (see Table 1).

**Why Do Women Prefer RTF?**

**Prediction 1.** Is TRM associated with a bigger loss to efficiency when children are present? When women did take small children with them offshore fishing, they experienced reduced return rates in TRM, but the sample size was very small: Children were present on eight trips and absent on five (see Table 2). Mean RTF return rates were 26 percent lower and trolling rates 64 percent lower when women fished with children under age five, but the effect was not significant and likely swamped by other exogenous sources of variance.

**Prediction 2.** Are women less likely to TRM when children are present? The presence of a child changed women’s
relative time allocation but not significantly (see Table 2). Women spent twice as much time trolling and slightly more time RTF when children were absent, but the difference was not significant.

Prediction 3. Is sharing a function of harvest size? The offshore model in Table 3 shows that harvest size has a strong effect on the likelihood of sharing for RTF but not TRM. The odds of sharing a 5,000-kilocalorie harvest of RTF fish are 55 times greater than a 1,000-kilocalorie harvest, but TRM fish at small and large harvests have the same odds of sharing.

Prediction 4. Do men prefer the more variable fishing activity? Trolling is associated with 65 times more variance and a success rate half that of RTF. The coefficient of variation in mean trolling returns is twice that of RTF (see Table 1).

Prediction 5. Is women’s time allocation biased toward the fishing activity with lower frequencies of sharing? TRM harvests are shared 85 percent of the time, whereas only 20 percent of RTF harvests are distributed beyond the acquirer’s household. The logistic regression model in Table 4 shows that after controlling for harvest-size effects, the relative odds of sharing following a trolling harvest (42.9) are still eight times higher than the odds of sharing a reef-top harvest (5.2), relative to the least shared fishing activity (NET).

Summary of Results

The null hypothesis that both men and women would choose sets of fishing activities that maximize their average calorific gain rate was not supported in any of the three macropatches.

On the beach, men spent more time line fishing for pelagic fish with a failure rate that did not diminish with time, while women spent the most time fishing for resident reef fish with a higher chance of success. Here, children were often present and did not cause women’s fishing returns to decline. LHF harvests were shared more frequently than SHF harvests, but SHF harvests were more likely to be shared as a function of harvest size. The fact that neither men nor women spent most of their time in sardine netting could indicate that the decision to line fish does not offer any opportunity cost to sardine netting because the sardines are generally always present along the foreshore, or that the marginal benefits from continuing to spend more time at NET may saturate relatively quickly, because the rate of caloric acquisition is so high that one can supply an entire family’s meal with ten or 15 minutes of netting.

On the reef, women chose to spend most of their time in the most efficient fishing activity, which was associated with significant declines in efficiency if combined with child care. Women switched to the second-highest efficiency fishing activity, RSH, when young children were present. Men preferred the lower efficiency, higher variance fishing activity (RES), at a significant cost to their overall returns, but these harvests were not more likely to be shared.

Offshore, men spent more time in high variance trolling, women in low variance RTF. The presence of small children had a negative, but nonsignificant effect on fishing-return rates and time allocation. Although sharing was more frequent for trolled harvests, harvest size predicted sharing only for RTF. Trade-offs between variance and mean efficiency affected men and women differently: Women maximized energetic efficiency when high efficiency resources were associated with low variance (intertidal), whereas men did so when high efficiency resources were high variance (offshore). Differences between men and women were mostly strongly predicted by differential variance sensitivity, whereas differences among women were predicted by child-care trade-offs. Child-care trade-offs explained why some women spent less time RFC and more time RSH, but they did not account for why women chose SHF over LHF, collected shellfish, or fished on the reef top in preference to trolling.

DISCUSSION

Ethnographic accounts of hunter-gatherer subsistence often conclude that women prefer to acquire resources associated with lower acquisition variance (Hawkes 1991; Noss and Hewlett 2001; Peacock 1991). This generalization holds across Oceania as well, where fishing strategies follow a very similar pattern to that observed among the Meriam (Chapman 1987). Women’s subsistence effort focuses on shellfish collecting and reliable types of fishing, whereas men turn toward pelagic fish and hunting turtles or marine mammals. Women’s harvests seem to be relatively consistent on both a daily and seasonal basis, and sometimes they may be more productive than men’s (Carrier 1982; Dye 1983; Ryan 1981).

The premise that women’s child-care constraints and trade-offs cause these gender differences in labor has a long history in anthropology. Women face trade-offs between foraging and caring for children, especially when children are very young and care contributes more to their survival than does more food (Hurtado with Hill, Kaplan, and Hurtado 1992). Women also face trade-offs between maximizing individual returns and group returns when they forage with their older children, who can be very productive on some resources and less productive on others (Hawkes with O’Connell and Blurton Jones 1995). They also face trade-offs between carrying heavy loads of food and carrying children (Blurton Jones 1987), which can influence birth spacing. Such trade-offs often make some resources more attractive than others: For example, Hadza women devote more time to foraging for tubers when they are postmenopausal, and they devote more time to berries and other “kid-friendly” foods during their reproductive years because children are more productive picking berries than root digging and, thus, can actually enhance team return rates (Hawkes with O’Connell and Blurton Jones 1995). The trade-off I tested here centered on the reduction in fishing efficiency when women must combine foraging with child care. There are many other possible trade-offs related to parental investment that women might face. These results suggest only that considerations of care compatibility.
TABLE 5. Subsistence production by Meriam adults, ten-household sample.

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<th>CH</th>
<th>#HH</th>
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are not among the trade-offs shaping the sexual division of labor among the Meriam.

My results would also seem to suggest that not all divisions of labor follow from the law of comparative advantage. All else being equal, household production of food would be greater if men collected shellfish rather than sparring fish, or if men acquired more reef-top and small-hook fish that are less likely to be shared. Meriam men do not specialize in fishing activities that confront women with high child-care trade-offs; they specialize in high variance fishing activities that are routinely shared. This preference for variance often trades off with the ability to maximize energetic efficiency, as it does for men fishing on the reef. Men prefer variance and unpredictability at a cost to their provisioning efficiency, and this choice further handicaps their ability to adjust subsistence effort to household needs. In contrast, women’s focus on more predictable resources allows them to tailor their harvest size through adjusting their time allocation. They can choose to stay longer to share surplus with another household, or they can quit early and keep what they acquire. Although women sometimes acquire high risk prey, they seem to find the trade-off between fame and reliability too expensive: According to one source, “Some women like to catch the big fish, but men like it more. Women, mostly they like the reliable fish.” When I asked why this was so, the person replied, “If a woman didn’t catch a fish for the table, she’d hear about it” (conversation with author, June 30, 1994).

This does not mean that men never provision their households. As Table 5 shows, men contribute 60 percent of the household’s total production after sharing. To make up for the loss in production because of their preferences for high variance, widely shared, and (sometimes) low return fishing activities, they collect turtle during the nesting season, an activity in which women and children also participate (Bliege Bird and Bird 1997). I have not explicitly considered turtle hunting and collecting here, because data on these activities were collected using different methodology and are not directly comparable. My colleagues and I have previously shown that turtle collecting satisfies very different subsistence goals than turtle hunting: Collectors net big benefits for their households, whereas hunters gain little in consumption but get big payoffs in social status, marriage, and family size (Bliege Bird and Bird 1997; Bliege Bird with Smith and Bird 2001; Smith with Bliege Bird and Bird 2003). Turtle hunting has a higher failure rate than turtle collecting. Hunted turtle are shared more widely than collected turtle, and women often collect but never hunt. The sex biases in turtle acquisition are thus consistent with the patterns in fishing described here.

There are two significant questions relative to gender and sharing that arise from these data: Why are trolled, large-hook, and speared fish more likely to be shared than an equal sized harvest of low variance fish, and why are low variance fish shared at all? It is not simply that men share more often than women; the type of fish acquired trumps sex in determining sharing. That is, when women acquire the same fish as men, they are equally likely to share. There are a number of possible explanations: Variance in large-hook fish is higher and thus demand for such fish is likely to be greater; small-hook harvests are shared only after household needs are satisfied; or, perhaps, different fish provide different types of sociopolitical benefits through sharing.

Meriam attach particular cultural significance to that swim quickly, grow large, and are temporally and spatially unpredictable, especially the pelagic fish Spanish mackerel (dabor), giant trevally (geigi), and northern blue-fin tuna (malouap). These can only be captured through the three fishing activities men more often choose: spearfishing, LHF, and trolling. Meriam revere these fish as symbols of their clan and patrilineage, claim their potency through metaphor, and advertise their capture in various subtle and not so subtle ways. Such fish are displayed prominently and are more likely to be shared at feasts. Attractive young men are likened to the kem guz of the dabor, the richest belly meat. Anyone, male or female, who manages to catch a large dabor or geigi adds to their reputation as a skilled fisher. When I asked several men why they spent so much time spearfishing or walking up and down the beach with a large hook and line, each told a story about the time that he had speared a 20-kilogram geigi on the reef or the time he caught a huge malouap from the beach. They always recount the tale with a satisfied grin, “Everyone was talking about it for days afterward.” These big, risky fish may be significant precisely because they honestly advertise the types of skills that advance sociopolitical goals (Bliege Bird with Smith and Bird 2001; Smith with Bliege Bird and Bird 2003). Sociopolitical competition is what makes a Meriam man (Beckett 1988).
Women’s gender identities are constructed through “hard work”; such an identity can be claimed through advertising how much time they have spent fishing, among other things. Meriam women thus may prefer low variance resources not only because they best provision households but also because harvest size more accurately reflects the time they spend fishing, and thus can be an honest index of production effort when shared (Bliege Bird and Smith 2005).

CONCLUSION

The data I present here suggest that Meriam gender differences in fishing are maintained by both men’s variance-prone and women’s variance-averse fishing decisions, and the ability of each type of resource to satisfy different subsistence goals. High variance resources are more frequently shared regardless of harvest size, satisfying sociopolitical goals. Low variance resources are shared less frequently, only when harvests are larger, satisfying a goal of optimizing household provisioning effort. These results support previous work implicating variance and sharing frequency as important resource “currencies” (at least as important as energy content) shaping gender differences in subsistence decisions. But they also refine our understanding of the relationship between variance, gender, and subsistence decisions: Variance sensitivities can prevent both men and women from maximizing energetic efficiency, sharing is a function of harvest size only for low variance resources, and men and women are equally likely to share if they acquire the same resource type. Although variation in women’s time allocation decisions is predicted by child-care trade-offs, such trade-offs do not seem to structure fishing differences between men and women. Taken together, these results offer challenges to a general model of the division of labor predicated on the notion that both men and women prefer to acquire resources that optimize household provisioning effort.

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Charnov, Eric

Draper, Patricia

NOTES

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1. For additional background on Meriam culture and ecology, see Bliege Bird and Bird 1997, 2002; Bliege Bird with Smith and Bird 2001.
Bliege Bird
Meriam Fishing

Durkheim, Emile

Dye, Thomas

Ember, Carol R.

Halperin, Rhoda

Hawkes, Kristen

Hawkes, Kristen, with James F. O’Connell and Nicolas Burton Jones

Hewlett, Barry

Hurtado, Ana Magdalena, and Kim Hill

Hurtado, Ana Magdalena, with Kim Hill, Hillard Kaplan, and Ines Hurtado

Jochim, Michael A.

Kaplan, Hillard, with Kim Hill, Jane Lancaster, and Ana M. Hurtado

Kaplan, Hillard, and Kim Hill

Lévi-Strauss, Claude

Murdock, George P.

Murdock, George P., and Caterina Provost

Noss, Andrew, and Barry Hewlett

Peacock, Nadine

Ryan, Thomas

Sahlins, Marshall

Sanday, Peggy

Smith, Eric A.

Smith, Eric A., with Rebecca Bliege Bird

Smith, Eric A., with Rebecca Bliege Bird and Douglas W. Bird

Sosis, Richard