

Original Article

The hierarchy of virtue: mutualism, altruism and signaling in Martu women's cooperative hunting[☆]

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Abstract

Cooperative hunting is often assumed to be mutualistic, maintained through returns to scale, where, by working together, foragers can gain higher per capita return rates or harvest sizes than they can by hunting alone. We test this hypothesis among Martu hunters and find that cooperation only provides increased returns to poorer hunters while disadvantaging better hunters. Even so, better hunters still cooperate as frequently as poorer hunters. We ask whether better hunters are advantaged in secondary sharing distributions or whether they bias their partner choice to kin or household members. We find that better hunters are not more likely to pair up with kin and they do not gain consumption benefits from acquiring more. They share a greater proportion of their harvest than poorer hunters: no matter how much one produces — better hunter, worse hunter, cooperator, solitary hunter — all eat the same amount in the end. Such a result suggests the hypothesis that cooperation might be a costly signal of commitment to the public interest on the part of better hunters, which generates trust among camp members and facilitates strong social networks, particularly among women, who cooperate more than men. While some foragers may benefit through cooperation from returns to scale or risk reduction, others may benefit more through signaling commitment and generating trust.

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1. Introduction

When hunters have the option of jointly pursuing prey, they are expected to do so primarily when there are direct, mutualistic benefits in the form of increasing returns to scale. Previous work has shown that cooperative hunting is likely to be maintained when coordinated action increases individual hunting success, prey encounter rates or harvest size obtained, or reduces the costs of search and pursuit leading to increasing per capita foraging return rates (Alvard, 2001; Alvard & Nolin, 2002; Packer & Rutan, 1988; Smith, 1981, 1991). The benefits achieved by cooperative hunting are gained through distribution of the subsequent harvest

among the members of the hunting party, such that those who cooperate gain increased individual consumption return rates (measured as kilocalories consumed per unit of time spent foraging) relative to what they could achieve through hunting alone.

Despite the synergistic benefits possible with cooperative hunting, conflicts of interest, failures of coordination, extensive free riding and heterogeneity among individual foragers in ability and access to group production can produce differential benefits to cooperation, raising questions about how collective action in group hunting and other forms of production is sustained (Hawkes, 1992; Ostrom, 1991). If group foraging involves striking a balance between the benefits of cooperating and the costs of interference competition, groups might become larger than optimal for all members if solitary foragers still do better to join them rather than hunt alone (Smith, 1981, 1985, 1991). When group members find it costly to exclude joiners, the benefits of cooperative hunting will be lower for all than if group sizes are kept close to optimal. Cooperation may also fail to

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provide higher per capita benefits if the distribution of prey following the hunt is biased or non-cooperators are allowed to gain access to the group's production. This can lead to a reduction in cooperation; Sosis, Feldstein and Hill (1998) found that the distributions of cooperative fishing groups on Ifaluk were biased toward canoe owners and large landholders, and, as expected, such individuals fished cooperatively more often than small-holders and men who did not own canoes. Cooperation is also sensitive to partner choice if hunters differ in their hunting abilities or effort, especially when solitary hunting offers returns that are just a bit lower than those from a cooperative hunt. If better hunters do not pair up with other good hunters, or exclude poor hunters from the party, they might not see any synergistic effects of cooperation relative to what they could achieve by hunting alone (Packer & Ruttan, 1988; Winterhalder, 1996). If it is too costly for hunters to assert control over the composition of hunting groups, better hunters are expected to hunt alone more often than poorer hunters. Finally, cooperative hunting can only provide synergistic benefits if the benefits of cooperation are outweighed by the costs of harvest losses to non-hunters through demand sharing. Among Lamaleran whale hunters, crews of at least eight gain higher returns from whale hunting than from solitary fishing, but the payoffs to this strategy depend upon strict rules for division that specify certain portions to those who play certain roles on the hunt, thus minimizing losses to free riders (Alvard & Nolin, 2002).

In this article, we ask whether or not returns to scale structure the benefits of cooperative hunting among Martu, Aboriginal foragers of the Western Desert in Australia. Martu are the indigenous owners of the estates that surround Lake Disappointment and the Percival Lakes in the northwest section of Australia's Western Desert (see Tonkinson, 1974, 1978, 1988, 1991, 1990, 2007; Walsh, 1990). As highly mobile hunter-gatherers in one of the most remote and arid regions of Australia, many Martu managed to maintain their lifeway relatively autonomous of colonial influence well into the second half of the 20th century. We focus particularly on Martu women, who frequently hunt small animals, and supply half of the bush meat that people consume (Bliege Bird & Bird, 2008). Historic band composition and contemporary residential patterns among Martu may have been critically shaped by the extent to which women engage in cooperative task specialization (Scelza & Bliege Bird, 2008). Sharing among Martu can also be extremely equitable for some resources, despite variance in productive effort (Bird & Bliege Bird, 2010; Bliege Bird & Bird, 2008). Some of this variability stems from gender- and age-related specialization on different productive activities: some individuals spend more time hunting, others more time collecting; some produce more small game, others produce more large game (Bliege et al., 2008; Bird, Bliege Bird & Codding, 2009). Such variability provides an ideal case study of the factors influencing cooperative production.

We first take a broad perspective on cooperative foraging among Martu, asking whether cooperation provides increasing returns to scale across foraging activities and how gender affects cooperation. We then narrow our focus to the hunting activity that provides the most meat by weight and comprises the majority of all hunting bouts, sand monitor hunting, asking whether cooperation on monitor hunts provides increasing returns to scale over solitary hunting, and whether there is individual heterogeneity in the benefits of cooperation. We ask whether better hunters compensate for losses incurred in cooperating with poorer hunters by cooperating less often, keeping more for themselves after sharing, or choosing to cooperate more often with kin.

1.1. Cooperation among Martu

Extensive descriptions and analysis concerning the nature of different types of Martu foraging activities are provided elsewhere (Bird & Bliege Bird, 2005; Bird et al., 2009; Bliege Bird & Bird, 2005; Bliege et al., 2008; Codding, Bird & Bliege Bird, 2010; Bliege Bird, Codding & Bird, 2009). Below we focus on the most frequent hunting activity (sand monitor hunting) and provide some brief comments on the cooperation and patterns of distribution associated with other foraging activities used in our analyses.

1.1.1. Sand monitor hunting

Sand monitor (*Varanus gouldii*) hunting is the most common foraging activity and mostly conducted by women. In this foraging activity, there are several different ways individuals might cooperate. In the winter season, where successful hunting involves targeting patches of old-growth spinifex grass for burning (Bird et al., 2005; Bliege Bird et al., 2008), two or more individuals often burn the same patch and share search costs for the prey revealed within. Each hunter will separate by about 100 m, calling the other over to assist in pursuit and capture if they find fresh tracks or a likely burrow. The hunters then coordinate in probing around the burrow in wide concentric circles with the point of their digging sticks to locate the den. One might dig up the entrance hole to determine the direction of the tunnel, the other probing for the terminal chamber. Depending on the depth of the den, hunters may then take turns in its excavation. In the summer season, when sand monitor are active on the surface, two or more hunters might cooperate to track and chase a single prey item, attempting to capture it before it retreats to its deep summer den. During a cooperative hunt, most partners pool their harvest: one hunter, usually the older or more skilled hunter, will transport all prey in her own bag. Typically, she will then take responsibility for cooking their pooled returns at the dinner-time camp (hereafter, DTC). As the individual monitor lizards are removed from the fire, she initially divides the harvest evenly between the partners she cooperated with while hunting (primary distribution). Each individual hunter then distributes her own portion to others in the DTC: her family, her children, her spouse, her brother

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