

Social Signaling and the Organization of Small-Scale Society: The Case of Contact-Era New Guinea

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Abstract Small-scale society furnishes the bread and butter of archeological research. Yet our understanding of what these communities did and how they achieved their purpose is still rudimentary. Using the ethnography of contact-era New Guinea, this paper presents a “social signaling” model of small-scale social systems that archeologists may find useful for contextualizing and interpreting the material record of these societies. It proposes that the organization of small-scale society was oriented, among other goals, towards biological and social reproduction, subsistence optimization, and military defense. To advance these multiple collective interests, however, these communities had to deal with three problems: an optimality problem, a conflict-of-interest problem, and a free-rider problem. The optimality problem was solved with a modular (or segmented) social structure, the conflict-of-interest problem by a process of social signaling, and these two solutions together operated to resolve the free-rider problems they created. In addition to explaining the structure and function of small-scale societies, the model provides a unified framework that can account for the ceremonial behaviors, core cultural conceptions, and leadership forms that these societies generated.

Keywords Small-scale society · Middle-range society · Group formation and maintenance · Signaling · New Guinea

Introduction

Small-scale societies, the band and “tribal” formations that were humanity’s ancestral social environment, are the bread-and-butter of much archeological research. But what was a small-scale society *for*? Why did humans form these collectivities in the first place, and how did they function to realize their goals? These are big questions, and

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from time to time, both anthropological and archeological theorists have been brave enough—the uncharitable might say, foolhardy enough—to try and answer them (e.g., Adams 1975, pp. 222–228; Bender 1985; Braun and Plog 1982; Johnson 1978, 1982a; Sahlins 1968; Service 1971; Smith 1981a; see also Feinman and Neitzel 1984). Given how basic and how important they are to the human condition, though, it is surprising that these issues have failed to attract more interest and that our answers are not more advanced. For the most part, small-scale society is treated as a given, a baseline or backdrop for analysis rather than as an object of investigation; explanations, when they are ventured, tend towards adumbrated assertion rather than detailed inquiry.

All the more reason, therefore, to welcome the renewed attack that anthropologists interested in collective action have recently launched on elementary forms of grouping behavior. Arguing primarily from first principles, economic theory, and field experiment, most of this work has focused on the free-rider problem. The promise of collective action is that people can realize goals that they could not—or could not as efficiently—realize alone; the problem lies in getting people to contribute to the public good when to do so would exact a personal cost. Individuals then have an incentive to capitalize on the benefits of collective action without contributing to it, a state of affairs that, left unchecked, would lead to the collapse of cooperation and the prospects of collective benefit. In small groups, inclusive fitness (Hamilton 1964) and direct reciprocity (Trivers 1971) may be sufficient to resolve the problem. It is less obvious, though, how it gets resolved in groups larger than the compass of genetic relatedness and the scale of human accounting capacities (e.g., Boyd and Richerson 1988). Mechanisms based on costly signaling (e.g., Gintis *et al.* 2001; Smith and Bliege Bird 2005), reputation (e.g., Panchanathan and Boyd 2004), and/or sanctioning (e.g., Henrich and Boyd 2001; Henrich *et al.* 2006) have all recently been suggested, and various processes also have been advanced to explain how and why cooperation emerges and spreads: the forces of natural selection (Hamilton 1964); rational action that envisions the long-term benefits of cooperation (e.g., Harsanyi and Selton 1988); the greater resilience of cooperation in the face of the stochasticity inherent in interaction (e.g., Young 1998); and/or the action of intergroup competition (e.g., Boyd and Richerson 2002). (For a succinct summary, see Henrich 2006).

These analyses are important, but there remain two further challenges to collective action that have been rather overlooked. The first is an *optimality problem*. Collective action in the public good is commonly referred to as “prosocial behavior,” but this is an unfortunate term in that it represents as a single behavior what are actually different actions—including “sharing, comforting, helping, rescuing, or defending” (Gurven and Winking 2008, p.179). This is a problem because different kinds of collective benefit are most efficiently served by different forms of collective action and usually also by different sizes of social group. As a result, a collectivity that wishes to capitalize on more than one kind of public good simultaneously faces an efficiency problem. Consider the forms and scales of cooperation entailed in achieving reproduction as opposed to defense against predation. The former commonly involves collaborative actions that include sexual and nurturing activity; the latter rests instead on behaviors such as organized surveillance and armed, coordinated combat. If a set of individuals hopes to realize both outcomes efficiently, then for one thing their cooperative actions have to be

scheduled: individuals under attack from human or non-human predators are well advised, for instance, to postpone their sexual activity until the danger has passed. The greater challenge, though, is that different common interests are usually better served by different scales of collaboration. Successful reproduction, for example, requires the cooperation of as few as two individuals; mutual defense is better served by the cooperation of many. Consequently, deploying a single group to fulfill more than one function—a one-size-fits-all grouping—inevitably will incur sacrifices in the efficiency with which each function is served. A single group that seeks to fulfill both reproductive and defensive ends, for instance, inevitably will be larger than the optimal size required for reproduction and/or smaller than that needed for defense.

As Sahlins (1968, pp. 15–20) indicated quite some time ago, and as I shall argue in this paper, there is a straightforward solution to this optimality problem: a “pyramid of social groups” in which “[f]unctions are regulated by levels of organization” (ibid., p.15). In this *modular* social organization (as I shall call it to avoid the implication of hierarchy), different types of collective interest are served by different structural orders of grouping. Thus, several smaller groups, each optimally sized to serve one outcome (e.g., reproduction), are nested so that they can simultaneously cooperate as a larger group optimally sized to serve another (e.g., defense). The solution to the optimality problem, in other words, is a segmentary social system of the kind observed in several animal species (e.g., Dunbar 1989) and most, if not all, human societies, including even the elementary hunter-gatherer band, which is comprised of several family-group segments.

If a modular social order resolves the optimality problem, however, it exacerbates a further challenge to collective action. In addition to the free-rider and optimality problems, individuals seeking to capitalize on group action must also deal with a *conflict-of-interest problem*. How do people whose other interests may not coincide suppress these differences in order to secure the benefits of collective action? In a modular or segmentary organization, how do individuals with a common interest in securing one outcome (e.g., defense) manage their collaboration in the face of conflicting interests with respect to another (e.g., reproduction)? How do they ensure that their competing interests vis-à-vis reproduction do not produce the kind of fighting that would erode or explode the collaborative action required to secure their common defense (see also Sahlins 1968, p. 17)? In politically centralized states, this conflict of interest problem is managed by the state’s claim to monopolize physical violence and its provision of centralized and (ideologically, at least) “neutral” organs of detection, mediation, adjudication, and sanction. But what is to be done in small-scale, politically uncentralized communities that lack centralized organs of social control? In the absence of powerful, third-party institutions to provide “objective” mediation and sanction, how do subgroups devoted to reproduction and groupings dedicated to defense resolve conflicts of interest without recourse to physical violence?

Rather than resort to actual fighting, I shall argue, small-scale societies manage their conflicts of interest through *symbolic* fighting. As costly signaling theorists have recently pointed out, organisms whose interests may otherwise conflict can nonetheless mutually benefit, under certain circumstances, by honestly communicating to one another their abilities, intentions, or other hidden qualities (e.g., Bliege Bird and Smith 2005; Grafen 1990; Hawkes 1993; Hawkes and Bliege Bird 2002;

Johnstone 1997; Smith and Bliege Bird 2005; Zahavi 1975, 1997). The “ritualized” fighting exhibited by many animal species provides a case in point. In these fights, conflicts over mates, resources, sanctuaries, and so on are decided not by dangerous fighting but by honest signals of fighting strength such as threat displays (*e.g.*, charging, roaring) or trials of strength (*e.g.*, head butting, tail biting, or pushing contests). Ritualized fighting, in essence, is a low-cost means by which individual competitors of approximately equal fighting strength can assess which of them would win a fight to the death without either of them incurring the catastrophic risks involved in an actual fight to the death (*e.g.*, Archer and Huntingford 1994; Clutton-Brock *et al.* 1979; Enquist and Leimar 1990; Jakobsson *et al.* 1979; Maynard Smith and Price 1973; Parker 1974).

As some costly signaling theorists have pointed out, what goes for single organisms and individuals should also apply to social groups. Under certain circumstances, it may be mutually beneficial for small autonomous groups such as families or lineages to manage their conflicts of interest over mates, resources, *etc.* by substituting honest signals of their fighting strength (or social “power”) for lethal deployments of it (Boone 1998, 2000; see also Bliege Bird and Smith 2005, pp. 226–228, 235; Boone and Kessler 1999). What I want to emphasize here, however, is that a system in which honest signals of military strength are substituted for actual fighting has a potential far beyond a mutual reduction of the morbid and mortal costs of physical violence *between* autonomous groups. It is also the key to articulating social organization *within* these groups. On the one hand, it allows the individuals within a modular social order to manage their conflicts of interest without resorting to physical violence, thereby enabling their collaboration to secure whatever they deem to be their collective interest. On the other, it also allows subgroups within such an order to manage their conflicts without recourse to violence. Thus, subgroups optimally sized to serve one end (*e.g.*, reproduction) can manage their conflicts of interest by signaling (rather than resorting to) their military strength, thereby facilitating their cooperation as a larger group, optimally sized to serve another (*e.g.*, defense). In such a system, signaling benefits everyone, even losers, because, in addition to sidestepping the physical costs of dangerous fighting, it secures the benefits of collective action—benefits that could not be realized by individuals or individual subgroups acting alone. To draw attention to this critical *social* property of individual and group displays of military strength, I shall refer to them as *social signaling*.

A system based on social signaling has one further critical social property: it contains its own solution to the free-rider problems it creates. In such a system, the rewards that flow from a subgroup’s or a group’s military strength are distributed in proportion to an individual’s or subgroup’s contributions to this strength. Those individuals and subgroups who demonstrate the most commitment to and the greatest capability in defending personnel and/or resources—whether through actual fighting against enemies beyond their community or through displays of military strength oriented towards others within their community—are those who become dominant within their communities and receive privileged access to mates, resources, and other rewards. In other words, the incentive to participate in a social signaling system—both for individuals and for subgroups within a community—is the assurance of receiving in return rewards proportionate to the contributions they have made.

In this paper, I develop and elaborate this social-signaling model of group formation and organization, drawing for illustration and empirical substantiation on the ethnographic record of New Guinea and my own fieldwork among the Yangoru Boiken of the Sepik Basin. The paper divides into three main sections. Following a brief introduction to New Guinea, the first section addresses the structure of New Guinea societies. At contact, New Guinea social systems each typically comprised a set of allied communities that sought to maintain peace among members of the set while warring with other, similar sets nearby (Fig. 1). The individual communities within an allied set (referred to in the literature by terms such as “longhouses,” “villages,” and “tribes”) assumed a nested, segmentary structure in which elementary groups optimally sized to advance biological and social reproduction combined to form larger groups suited to subsistence optimization, which in turn combined to form even larger groups dedicated, among other things, to military security.

The second section of the paper examines social signaling. Although the modular structure of New Guinea societies enabled the simultaneous pursuit of multiple goals by different orders of optimally sized groups, the operation of this structure was chronically threatened by conflicts of interest among allied communities, their component groups, and their individual members. Social signaling was the distinctive mechanism that allowed communities to manage these conflicts of interest. By deploying honest signals of their military strength, the individuals, sub-groups, and communities within an allied set were able to establish who would

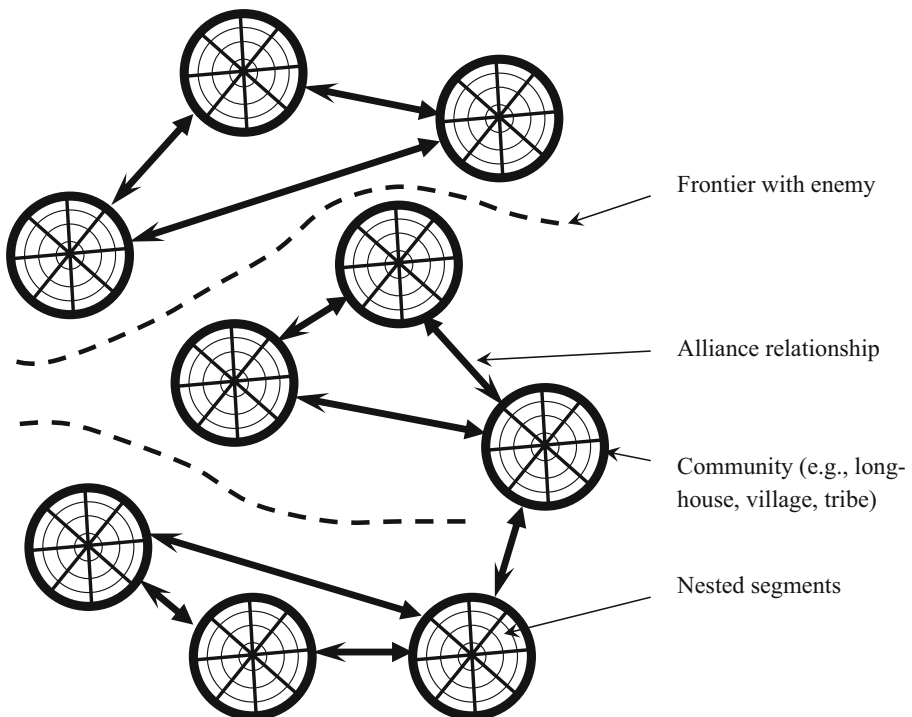


Fig. 1 Schematic diagram of New Guinea social systems.

prevail in lethal fighting over conflicts of interest without ever having to risk the physical and social costs of actual lethal fighting.

The third section of the paper sketches how social signaling resolved its own free-rider problem while simultaneously shaping the nature and form of New Guinea leadership. In conclusion, I briefly consider how this model might inform archeological research, some of the ways in which it might be developed, and its place in understanding the evolution of more complex polities.

Reconstructing Contact-Era New Guinea Society

As “The Last Unknown,” New Guinea came under ethnographic scrutiny at a propitious moment in anthropological history, providing a sudden abundance of fresh field sites just as the production of anthropologists was booming in the wake of World War II. The result was an ethnographic record unparalleled in the breadth of its documentation of middle-range societies only recently fallen under colonial influence (Roscoe 2000). This record is not without its problems. No anthropologist ever made initial contact with the people he or she studied, and only a handful were even present prior to their “pacification.” For the most part, therefore, the ethnographic record describes communities that already had been dramatically reshaped by the colonial presence and the suppression of war. To reconstruct New Guinean life-ways in the contact-era—the period between initial engagement with foreign agents and the point at which that contact began significantly to affect social and cultural life—it is therefore crucial to supplement the anthropological record with the numerous, mostly unpublished reports, censuses, and maps produced by those who were present during this era—early explorers, gold prospectors, labor recruiters, missionaries, and patrol officers. These sources commonly lacked anthropological training, but they were privileged to make the first contacts with New Guineans; a number of them subsequently lived for months or even years with local populations, and some even became fluent in their languages.

Accessing and presenting this expanded documentary record can be challenging. There are significant problems in defining a “culture” or “cultural unit” for the purposes of comparison (Gatewood 2000; Roscoe 2008a), but by any definition, New Guinea is home to at least a thousand cultures, and the volume of relevant material is therefore impossible to survey in its entirety (Roscoe 2000, pp. 80, 81). As a compromise, this paper focuses on four key regions: the Sepik Basin of Papua New Guinea, the southwest coast and the northern interior of Irian Jaya, and the highlands chain that runs down the island’s center (Fig. 2). These regions embrace about a half of the island’s cultures and include a representative spectrum of its environmental, demographic, subsistence, and political diversity. The Sepik, in addition, is home to the Yangoru Boiken, a horticultural people among whom I have conducted over 2 years of fieldwork.

Even with this restricted ethnographic focus, unfortunately, there remains a further problem: how to provide sufficient information to validate the analysis without advancing so much as to render the results unreadable. As a solution, admittedly imperfect, I have chosen to document my principal points with illustrative data from a couple of societies and to relegate the remainder of the evidence to footnote citations.

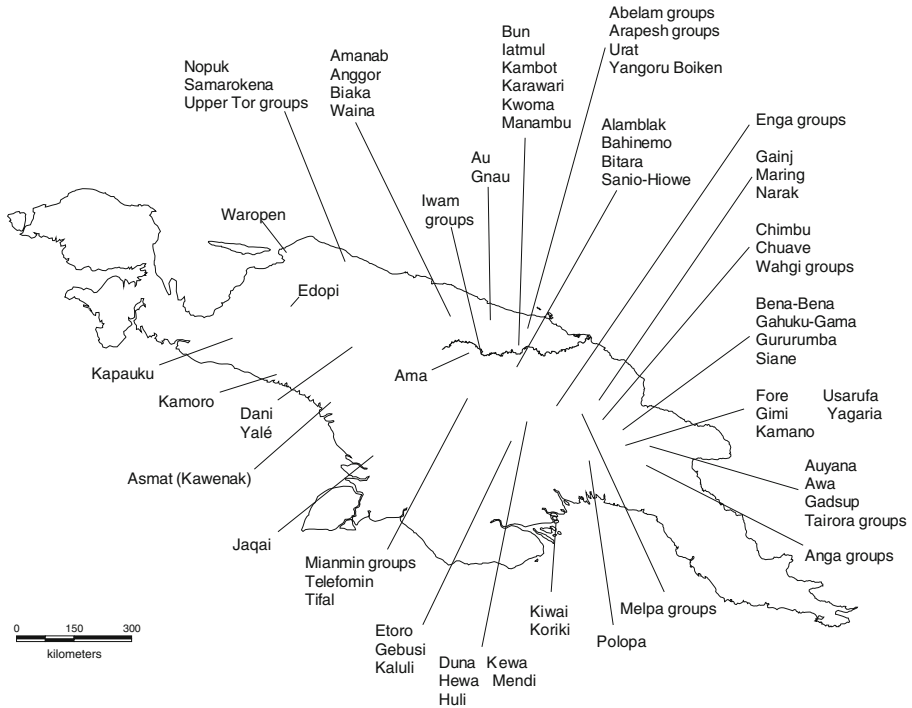


Fig. 2 Contact-era New Guinea communities.

The Modular Construction of New Guinea Society

Advancing an argument that has enjoyed considerable influence in archeology (*e.g.*, Adler and Wilshusen 1990; Bandy 2004; Price and Brown 1985; Kosse 1990, 1994, Gregory Johnson 1978, 1982a) proposed that the segmentary organization of small-scale society is an adaptation to inherent constraints on the human capacity to process information. In this “scalar-stress” model, humans encounter cognitive difficulties in managing collective action when social networks are expanded to embrace more than about six functional entities (individuals, departments, *etc.*). As its scale increases, therefore, a community adapts by stacking networks of individuals into decision-making hierarchies. Individuals drawn from several lower-level networks are organized as a higher level network that monitors and manages information flow and makes decisions on behalf of those in lower structural levels (Fig. 3).

Social organization in New Guinea was very different to that envisaged in the scalar-stress model. Social structure consisted of nested spheres of cooperation rather than a hierarchy of networked individuals (Fig. 3). Furthermore, these nested spheres of collective action advanced not one but several goals simultaneously, none of which focused on managing information or decision-making. Unfortunately, the structure and operation of these systems have been rather obscured by the analytical dispositions of those who constructed much of the New Guinea anthropological record. From 1950 until well into the 1970s, Melanesian anthropologists were

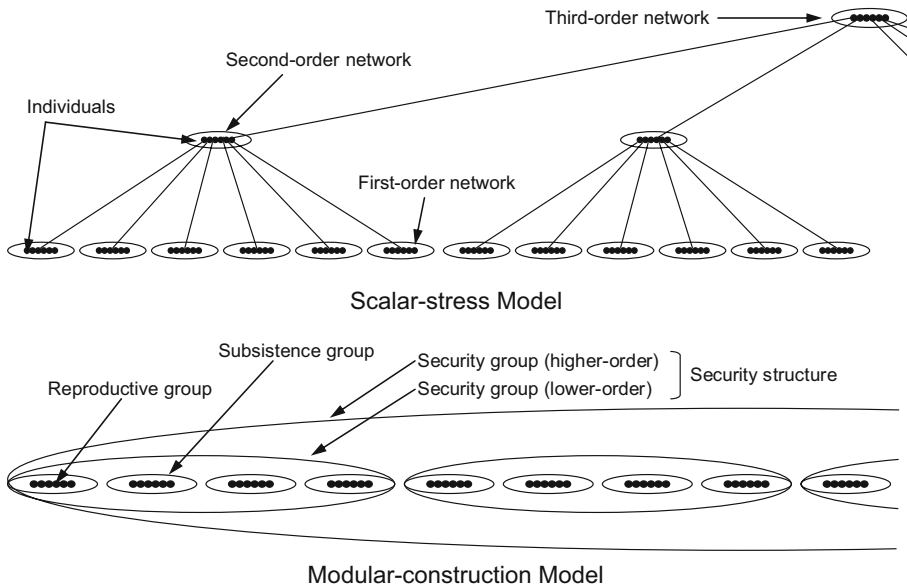


Fig. 3 Comparison of scalar stress and modular construction models of a community (alliance relations to other communities omitted for clarity).

inclined to take ideological structures as indexing organizational practice. Thus, genealogical branching and the nature of genealogical connections (*e.g.*, whether a descent connection was stipulated as opposed to demonstrated) were used to identify the existence of groups such as phratries, tribes, clans, subclans, sub-subclans, lineages, sublineages—even sub-sublineages—regardless of whether such groups had any meaning for local people’s lives. The troublesome result was to insert “ghost” groupings into the ethnography of New Guinea society, groups that existed in anthropological minds but had no organizational reality in New Guinea society. Like many other ethnographers, for example, Glick (1963, p. 25) dutifully recorded the existence among the Gimi of “the lineage,” “a group of kinsmen sharing known patrilineal ancestry.” In contrast to other ethnographers, however, he was scrupulous enough to admit that, in practice, “lineage distinctions are almost entirely submerged. Men very seldom identify themselves by reference to a lineage. Indeed they may explicitly deny the validity of distinctions at this level, even while conceding the existence of lineage names” (*ibid.*, p. 30; see also Clarke 1971, pp. 27–29; O’Hanlon 1989, p. 31; Strathern 1971, p. 64).

A second unfortunate consequence of this genealogical focus was to divert inquiry away from what the groups in these structures actually *did* in practice. Even if the tribe, clan, subclan, and so on enjoyed a reality independent of the anthropological mind, few systematic inquiries were made into the contexts that produced their collective action and the interests that it advanced. This avoidance was no doubt exacerbated by an increasingly critical reaction at the time to functionalism: it was difficult to investigate what a group did without also conjuring the toxic term, “function.” One need hardly be a functionalist, though, to inquire into

the functions of social groupings. It is certainly absurd to assume that a reified “society” or “culture” somehow manipulates humans behind their backs into behavior that advances their material, biopsychological, or social well-being (Vayda 1989). But it is entirely defensible to insist that humans have interests and that they may seek to advance those interests through group action.

Why then did New Guineans form social groups, and what did these groups do? In animal species, Alexander (1974) has observed that grouping appears to be motivated by one or more of three principal interests (see also Krebs and Davies 1993, pp. 120–126; Smith 1981a). The first and most obvious is reproduction, the formation of pair- and parental bonds to produce, feed, protect, and socialize offspring. The second is economic: collective action may improve the efficiency and/or the stability of resource procurement. The third is defense against predation: multiple pairs of eyes and ears can improve the ability to detect predators; “selfish-herd” effects can dilute the chance of falling prey to a carnivore; the jostling of individuals in a group can confuse a predator; and organized actions such as “mobbing” can drive predators away or even deter them from attacking in the first place. In New Guinea, grouping behavior no doubt advanced a variety of culturally particular interests, but the evidence strongly suggests that, everywhere, it was dedicated in addition to fulfilling these same three concerns: reproduction, subsistence optimization, and defense.

The Reproductive Group

I am aware of no community in New Guinea that did not exhibit some version of what I shall term *the reproductive group*, a group that endures for about a generation in order to reproduce, socially as well as biologically, the descendant generation. A few diligent and dutiful ethnographers have gone so far as to identify and describe the functioning of this group (e.g., Eyde 1967, pp. 218, 219), but most simply refer to the presence of a “nuclear family,” “family,” “domestic unit,” or “household,” taking its reproductive function as self-evident. Parents and children formed the core of a reproductive group, but typically also it included one or two surviving members of the previous generation—elderly parents or other relatives who might be too old to care fully for themselves but who remained useful as care-givers or as sentinels when others were away. Reproductive groups averaged between about four and seven members.¹ Typically, but not always, these members ate from the same hearth; and often, though again not always, they occupied either a particular dwelling space within a longhouse, a structure to themselves, or both a men’s house and a women-and-children’s house.

If, as it would seem, the reproductive group was universal in New Guinea, its structural form and patterned relationships nevertheless differed considerably, both within and across communities. The most obvious structural variation was related to polygamy. The vast majority of New Guinea reproductive groups were monogamous, but every community allowed polygyny, albeit on a widely varying scale. At

¹ Reproductive group size: *Auyana* (c. 3.5–4.3 members)—Robbins (1982, p. 248); *Awa* (7.4 members)—Boyd (1975, p. 149); *Dani* (*Bokondini*; c. 5.1 members)—Ploeg (1969, p. 22); *Enga* (*Mae*; five members)—Meggitt (1965, p. 20); *Enga* (*Raiapu*; 4.5 members)—Waddell (1972, p. 21); *Gadsup* (5.1 members)—DuToit (1974, p. 293); *Yangoru Boiken* (five to six members)—Roscoe (n.d.a).

one end of the spectrum, a third of marriages in agricultural societies might be polygynous, with big men enjoying as many as ten wives (*e.g.*, Pospisil 1963, p. 35); at the other end, polygyny characterized no more than about one in 20 marriages in some hunter-foraging communities, with only the rarest husband having even three wives (Townsend 1969, p. 86). The principal exceptions to these generalizations appear to have been the Goeammer, Daranto, Waf, and Beeuw of the Upper Tor, where brothers in the *dzjigidzjaarberi*, a subsistence group made up of a “number of nuclear families”, reportedly were “allowed (free) sexual intercourse with each other’s wives” (Oosterwal 1961, pp. 200, 202).

There were marked differences also in the degree to which the offspring of a reproductive group were enculturated by social as opposed to biological parents. Although the norm was for parents to raise their biological offspring, it was not uncommon for a non-trivial proportion of children to transfer to other households. These transferences might occur shortly after birth, when a family with too many children gave a newborn to a recently bereaved mother in another, or later in life when, for example, the younger of several brothers might move to an affinal home to inherit the resources of an uncle or in-law without sons.

The Subsistence Group

For quite a while, anthropology assumed that the human family was not just a reproductive group but also an economic unit (*e.g.*, Murdock 1949, pp. 1–12), functioning not only to produce and enculturate but also to provide the material well-being for its members. In some environments or in the short run this may be true, and to this extent a reproductive group, though it primarily advances reproductive interests, may function also as a subsistence unit. In the longer term and especially in unfavorable environments, however, it may be difficult for a family to operate as an entirely independent economic unit. Members are occasionally incapacitated by illness, pregnancy, or injury, and from time to time they are obliged to pursue social, political, or religious commitments rather than economic obligations. Acting on its own, moreover, a family is likely to encounter problems procuring large or elusive game, and it may face debilitating stochastic variations in other harvests. As ecological and economic anthropologists have long stressed, however, these problems can be managed by increasing the size of the procurement group. By cooperating with members of other reproductive groups in drives or large-game hunting and then sharing the kill, for example, a reproductive group may increase its net capture rate. By pooling and sharing information and/or harvests, it can also increase the stability of its food supply (*e.g.*, Kelly 1995, p. 213; Lee and DeVore 1968, p. 11; Smith 1981a, 1987; Winterhalder 1986; Winterhalder and Smith 2000, pp. 58, 59).

In some intensive agricultural communities of the New Guinea highlands, it is possible that the contact-era reproductive group also constituted what I shall call the *subsistence group*, an enduring group dedicated to optimizing the efficiency and/or the stability of subsistence resource exploitation. In most New Guinea societies, however, the subsistence group incorporated on the order of two to four reproductive groups and about eight to 20 people (Table I). The largest of these subsistence groups were to be found among foragers who combined wild-sago gathering with hunting (Roscoe 2002, 2005). Among the Sanio-Hiowe of the Sepik, for example,

Table 1 Subsistence Group Form and Size by Subsistence Regime

Society	Subsistence regime	Subsistence group	Subsistence group: size
Sanio-Hiowe	Hunting; sago-gathering	Hamlet	20–25
Bahinemo	Hunting; sago-gathering	Camp/household	10–18 (?)
Edopi	Hunting; sago-gathering	Clan longhouse	c. 20
Au	Hunting; sago-planting; some horticulture	Lineage	c. 11–17
Gnau	Hunting; sago-planting; some horticulture	Conjugal families linked by descent	c. 17
Asmat (Kawenak)	Fishing; sago-gathering	Household	≥9
Sepik Iwam	Fishing; sago-planting	<i>Piukin</i>	15
Yangoru Boiken	Pig-rearing; horticulture	Lineage or subclan	c. 9–10
Siane	Pig-rearing; agriculture	Lineage	14–17
Kapauku	Pig-rearing; agriculture	Household	11
Highlands	Pig-rearing; agriculture	Nuclear family	c. 4–7 (but see text)

Sources: *Asmat (Kawenak)*—Eyde (1967, pp. 150, 219, 222, 223); *Au*—Fountain (1966, pp. 32, 34); Lumi Census Registers; Philsooph (1980, pp. 32, 331); *Bahinemo*—Dye and Dye (1967, pp. 3, 12); *Edopi*—Green (1986, p. 70); Kim (1997, pp. 201, 206); *Gnau*—Lewis (1975, pp. 17, 338); *Highlands (other)*—see text, footnotes 3 cf. 2; *Kapauku*—Pospisil (1963, pp. 38–40, 59); *Sanio-Hiowe*—Townsend (1978, p. 33, 2001, pers. com.); *Sepik Iwam*—Ambunti Census Registers; Laszlo (n.d., pp. 81–83); Rehburg (1974, pp. 214, 219); *Siane*—Salisbury (1962, pp. 15, 17); *Yangoru Boiken*—Roscoe (n.d.a). See also: *Kamoro*—Pouwer (n.d., pp. 145–147); *May-River Iwam*—Paulsen (1992, pp. 198, 199); *Polopa*—Anderson (1985, pp. 109, 110); *Upper Tor groups*—Oosterwal (1961, pp. 198–202); Waina—Gell (1975, p. 90).

the subsistence group appears to have comprised the (frequently changing) residents of a hill-top hamlet. To be “economically viable,” such a hamlet minimally had to have “a man who is an effective hunter and fisherman and a pair of women who are able to work sago (or at least one such woman and a widow who... can accompany her as babysitter and chaperone)” (Townsend 1978, p. 33). The hamlet, though, formed a unit for the purposes not just of production but also consumption: food was “shared throughout the hamlet” (ibid.). According to Townsend, hamlets with less than a dozen people were “not continuously viable” (ibid.), and their average size, at contact, was closer to 20–25 people (Townsend 2001, pers. com.).

At the other end of the scale, highland agriculturalists appear, at first blush, to have boasted the smallest subsistence groups in New Guinea. Here, the “basic” or “primary” “economic unit,” “the smallest productive and consumptive unit,” the “self-sufficient” economic unit was said to be the “nuclear family,” “family,” or “a woman and her husband”²—in other words, the reproductive group. Highland

² Family as domestic economic unit: *Anga (Yagwoia)*—Fischer (1988, p. 69); *Auyana*—Robbins (1982, p. 102); *Dani (Bokondini)*—Ploeg (1969, p. 130); *Enga (Mae)*—Meggitt (1971, p. 197); *Gadsup*—DuToit (1974, p. 279). Some sources designate the unit associated with production and/or consumption of food as a “household” or “domestic unit” rather than as a “family,” but to judge from their size these groups are also reproductive groups. Among the Hewa, they average 6.9 people (Steadman 1971, pp. 126, 217) and, among the Narak, 4.8 people (Cook 1967, p. 67).

societies depended primarily on the sweet potato, a high-yield crop that may have been sufficiently reliable and productive to allow a small unit to exploit it with security. Pospisil's detailed investigation of Kapauku Papuan economics, however, points to another possibility. Like other highlanders, the Kapauku were sweet-potato cultivators, and like other highlanders the reproductive group—a unit of 4.2 members “usually composed of a male... and of his dependants”—was the unit of “agricultural production” (Pospisil 1963, pp. 39, 40; see also Meggitt 1971, p. 197; Robbins 1982, p. 102; Waddell 1972, p. 20). Pospisil found, however, that the “organization of consumption” involved a considerably larger group—“the household” (ibid., p. 40)—a unit that averaged some 11.3 members who, “in order to assure a steady and balanced diet for all,” were supposed to “help each other in work, extend to each other needed credit, and *share all the food they produce*” (ibid., p. 39, emphasis added). What this suggests is that some highland ethnographers may have mistakenly identified the family-sized *production* unit as “the” economic unit, failing to notice the existence of a larger, consumption group devoted to stabilizing the outputs of several production units.

In a contribution with which many archeologists will sympathize, Braun and Plog (1982; also Plog and Braun 1984) proposed that “tribal” social organization could be explained in terms of environmental unpredictability. Tribal structures, they suggested, are hierarchically arranged “response mechanisms” in which smaller networks within the structure respond to limited, relatively brief environmental changes, with larger, higher-level networks activating as these perturbations become more serious. We lack the kind of diachronic data necessary to test these claims for New Guinea, but since subsistence groups were oriented to managing and stabilizing subsistence procurement, it is certainly plausible that they were adapted also to managing the effects of environmental perturbations on subsistence production. As Table I reveals, though, the mean size of these groupings was small—nowhere greater than 25 people—and, in most societies, far smaller than overall community size. It is possible that some New Guinea societies contained larger groupings dedicated to optimizing material concerns other than subsistence: a number of sources indicate, for example, that lineages and subclans cooperated in house-building, though it is difficult to be certain whether this activity was causal or epiphenomenal to their existence. Even so, these house-building groups—if they existed—were rarely more than 125 people, and, as with the subsistence group, often smaller than the span of the total organizations of which they were part. In sum, it is difficult to account for New Guinea macrosociology solely in terms of environmental or material risk. What we find instead is that the largest organizations in New Guinea society—the entities referred to in the literature as clans, men's house-groups, villages, and tribes—were dedicated not to material well-being but to security, to defensive concerns about military attack.

The Security Group

Several decades ago, the structure and organization of New Guinea communities briefly recruited the attention of social anthropologists to a puzzling discrepancy between the neatly structured political systems reported from African societies such as the Nuer, Tallensi, and Tiv and the far less tidy, “loosely” structured

systems that early fieldworkers were encountering in highland New Guinea (e.g., Barnes 1962; Langness 1964a; Lepervanche 1967). In the course of this debate, it was occasionally remarked that the “looseness” in New Guinea systems might somehow be linked to the intensity of their warfare (Barnes 1962). Indeed, Langness went so far as to suggest that warfare was likely “one of the most critical variables in any understanding of New Guinea social structure” (Langness 1964a, pp. 173, 174).

The idea that war has somehow shaped human grouping behavior is a longstanding—albeit poorly theorized—theme in archeology and social anthropology. It is the biologist, however, Richard Alexander, who has been its most persistent proponent. Under established social and ecological theory, Alexander (1979, pp. 221–223, 1987, p. 79) observes that it is difficult to account for the scale that human social formations have assumed in recent history. These organizations—complex chiefdoms, archaic and nation states—are larger by far than anything needed for reproduction or cooperative hunting. From an evolutionary point of view, furthermore, they would seem to be deleterious because they increase competition for mates and resources and elevate the transmission of parasites and infectious diseases. Given these problems, Alexander argues that only one factor is capable of explaining the emergence of such large communities: warfare. By making humans their own predator and prey, “their own principal ‘hostile force of nature’” (Alexander 1987, p. 79), warfare has acted as a formidable selective force, precipitating “balance-of-power races” that, among other consequences, have resulted in ever larger social groups. The “necessary and sufficient forces to explain the maintenance of every kind and size of human group above the nuclear family, extant today and throughout all but the earliest portions of human history, were (a) war, or intergroup competition and aggression, and (b) the maintenance of balances of power between such groups” (Alexander 1979, p. 222).

Alexander’s proposition has been echoed both in anthropology and in archeology. Sahlins (1961, 1968, p. 17), Carneiro (1970), Service (1971, pp. 100–109), Adams (1975, pp. 226–228), Haas (1990), Johnson and Earle (1987, pp. 200, 201, 325), and others have all argued that “tribes” are essentially bands that united to better compete and fight against their neighbors (usually over resources). Carneiro (1970), Service (1975, pp. 299, 300), and many others have proposed that warfare was also influential in generating more complex political forms. Foreshadowing Alexander’s balance-of-power races, for example, Webster (1975) argued that, under certain circumstances, war can have “a kind of ‘snowball’ effect” in propelling chiefdoms to statehood (see also Giddens 1985, pp. 26, 27).

In light of archeology’s growing interest in the implications of war for human social affairs (e.g., Arkush and Allen 2006; Keeley 1996; LeBlanc 1999), these arguments deserve renewed attention. What needs to be clarified, however, is a critical point that they either overlook or misrepresent: do large social groups confer an advantage in offensive warfare, defensive warfare, or both? Alexander’s position on the question is ambiguous. In advancing his balance-of-power argument, he seems to take the view that large social groups confer both offensive and defensive advantages in competition for resources. In his earlier work, however, he specified *defense* (along with reproduction and subsistence optimization) as the motive driving grouping behavior (see above).

It is plausible that large social groups did enhance the ability to launch attacks. If we are to judge from the ethnography of New Guinea, however, this was not the primary interest motivating their formation: the macrostructures of small-scale societies were instituted first and foremost to advance *defensive* capabilities (Roscoe 1996). To document this essential point and elucidate how defensive organization operated in New Guinea, I must first burden the reader with three technical terms: *security group*, *security structure*, and *alliance*. By *security group*, I shall mean an enduring group (e.g., a “clan” or a “village”), the primary function of which is to defend against some type of attack (e.g., in the case of a clan – to anticipate the argument – attack during the day; in the case of a village, attack by night). By *security structure*, I shall mean a nested structure of two or more types of security group (thus, as I shall argue, a village security structure consisted of two kinds of security group: a *village* security group, which acted to protect its members against attack during the night; and the several *clan* security groups that together made up the village security group, but acted separately in protecting their members against attack during the day). An *alliance* is a (politically contingent and fragile) relationship of mutual peace between two security groups or two security structures (e.g., between two village security structures).

Warfare exacted a heavy toll on New Guineans. Its most common forms were treachery and small-scale ambush. On the fringes of the highlands and among canoe-borne head-hunters in the lowlands, large-scale raids were also common, sometimes mobilizing more than a hundred warriors in a surprise attack that could all but exterminate its target. In other parts of the highlands, large-scale battles were the norm. Commonly, these ended in stalemate and the negotiation of peace, but occasionally a victorious force was able to push deep into the territory of the vanquished, raping, massacring, firing houses, slaughtering pigs, destroying crops, and putting to flight whoever survived. Analyses of genealogies referencing the pre-contact period, the most reliable source of evidence we have, indicate that between 12% and 35% of a population typically could expect to die in war, with figures in some areas perhaps reaching as high as 50–60% (e.g., Berndt 1971, pp. 397, 399; Fortune n.d., p. 12; Glasse 1968, p. 98; Hayano 1972, p. 287; Johannes 1976, p. 85; Meggitt 1977, pp. 108–112; Robbins 1982, p. 211). Even the supposedly “peaceful” Mountain Arapesh (Mead 1935) appears to have sustained a war mortality in excess of 10% (Roscoe 2003, p. 583).

New Guineans developed an array of protective strategies to ameliorate these dangers. Many settlements were defensively located in swamps or tree-houses, on hilltops, ridges, or poles, or along narrow tributaries leading onto major rivers. Communities commonly fortified themselves with palisades, ditching, booby traps, and chokepoints (Roscoe 2008b), and most were tightly nucleated. The defensive advantages of nucleation are widely recognized, and many observers in New Guinea commented on its value for “shared defence,” “safety against attack,” “mutual protection,” “group security,” and so on.³ There is an important implication to these observations, however, that has gone largely overlooked: nucleation can serve the purposes of defense only if those who nucleate are also prepared to act as a group,

³ Nucleation and security: e.g., Abelman—Forge (1972, p. 367, 1990, p. 162; Lea 1964, p. 160); Amanab—Juillerat (1996, p. xxi); Bitara—Bragge (n.d., p. 401); Etoro—Kelly (1977, p. 136); Gnau—Lewis (1975, p. 19); Iwam (Sepik)—Laszlo (n.d., pp. 76, 79); Kamoro—Pouwer (n.d., p. 97); Upper Tor—Oosterwal (1961, pp. 22, 23, 53).

on an ongoing basis, in common defense of one another. Successful defense, in other words, depends not only on nucleation or, for that matter, fortification but also on what I shall call a *security group*, an enduring unit whose members cooperate in the event of an attack to defend one another from injury.

Security groups constituted the core of New Guinea macrosociology. In the ethnographic literature, they are variously referred to as the “longhouse community,” the “men’s-house group,” the “(residential) hamlet,” the “clan,” the “parish” (or “parish descent group”), the “village” (or “village group”), the “clan cluster,” the “confederation,” the “tribe,” or simply “the community.” Although rarely actually called a “security group” (though see Robbins 1982, p. 105), they were nonetheless said to “unite for defensive purposes,” to “provide mutual defense,” or to “act as a unit in defense.” Their members were said to “protect” the unit from “military threats,” “protect each other against people attacking them,” or “to act as a unit to protect members from being killed and their gardens from being destroyed.” They were “expected to aid each other against outside attackers,” “against outsiders...to come to one another’s aid,” or “feel some responsibility to repulse an invader.” They displayed “unity in the face of the enemy,” “cohesion through opposition” in war, or were “unified in opposition to other like groups.”⁴ In addition, the group was described as a “basic” or “primary” “territorial unit,” whose members “joined in mutual protection” or “fought to defend” against “outsiders” their “land,” “the (home) territory,” or their “domains.”⁵

Although most descriptions cast the security group as a *defensive* unit, some ethnographic statements refer to it as, in addition or alternatively, a unit that practiced offensive warfare (or “vengeance”).⁶ Other accounts are more ambiguous, referring to the security group simply as a “fighting,” “warring,” “war-making,” or “military” unit, or as a group whose members are “concerned with the organization

⁴ Security unit as defensive unit: *Anggor*—GR 1-52/53 (1952, p. 5; Huber 1974, pp. 47, 214); *Arapesh (Ilahita)*—Tuzin (1976, p. 59); *Asmat (Kawenak)*—Eyde (1967, pp. 276, 280); *Awa*—Boyd (1975, p. 96); *Au*—Philsooph (1980, p. 558); *Bena Bena*—Langness (1964b, p. 52); *Bun*—McDowell (1988, p. 127); *Chimbu*—Brown and Brookfield (1959, pp. 40, 51); *Enga (Kyaka)*—Bulmer (1960, p. 201); *Etoro*—Schieffelin (1991, p. 60); *Fore*—Glasse and Lindenbaum (1973, p. 365); *Gadsup*—Leininger (1966, p. 87); *Gahuku-Gama*—Read (1951, p. 156, 1971, pp. 215, 216); *Gainj*—Johnson (1982b, p. 160); *Gimi*—Glick (1963, p. 71); *Hewa*—Steadman (1971, p. 159); *Huli*—Glasse (1968, pp. 23, 24, 34, 132); *Iwam (Sepik)*—Laszlo (n.d., pp. 71, 184); *Rehburg* (1974, p. 221); *Jalé*—Koch (1974, p. 135); *Jaqai*—Boelaars (1981, p. 20); *Kaluli*—Schieffelin (1991, p. 60); *Kamano*—Zuckerman (1984, pp. 294, 295); *Kapauku*—Pospisil (1963, p. 40); *Manambu*—Harrison (1993, p. 68); *Melpa (Kaugel)*—Bowers (1968, p. 136); *Melpa (North)*—Strathern (1971, p. 26); *Tairora (Southern)*—Mayer (1987, pp. 72, 94, 99, 103); *Wahgi (North)*—O’Hanlon (1989, pp. 24, 28); *Wahgi (South)*—Reay (1959, p. 54).

⁵ Security group and territory: *Amanab*—Juillerat (1996, pp. 6, 7); *Anggor*—Huber (1974, p. 33); *Au*—Fountain (1966, pp. 15, 26); *Auyana*—Robbins (1982, p. 105); *Awa*—Boyd (1975, p. 91); *Bun*—McDowell (1988, p. 127); *Enga (Kyaka)*—Bulmer (1960, p. 26); *Enga (Mae)*—Meggiitt (1965, pp. 231, 232); *Enga (Raiapu)*—Feachem (1974, p. 12); *Gadsup*—Leininger (1966, p. 87); *Iwam (May)*—Paulsen (1992, pp. 213, 225); *Maring*—Rappaport (1968, pp. 17, 21); *Melpa (North)*—Strathern (1972a, b, p. 55); *Mendi*—Ryan (1961, p. 14); *Yagaria*—Smith (1981b, pp. 47, 48).

⁶ Security group as offensive unit: *Arapesh (Ilahita)*—Tuzin (1976, p. 59); *Gadsup*—Leininger (1966, p. 87); *Hewa*—Steadman (1971, p. 162); *Kamano*—Zuckerman (1984, pp. 294, 295); *Manambu*—Harrison (1993, p. 68); *Polopa*—Brown (1979, p. 722); *Siane*—Salisbury (1962, p. 15); *Tairora (Southern)*—Mayer (1987, p. 72).

of force,” or who “fight united” or “act collectively” in war.⁷ Without question, security groups in many societies did act as both offensive and defensive military units, but there are three reasons for concluding that they were first and foremost defensive units and only secondarily offensive units. To begin with, several ethnographic sources state the case explicitly. Thus, for the Anggor, warfare was “the ultimate manifestation of village solidarity, when co-villagers stand together to defend their community against violence and destruction” (Huber 1974, p. 214); “men must stand with their village and defend their cosmos by defending each other” (Huber 1975, p. 657). “The main function of the [Sepik Iwam] village as a whole is defense against an attack from outside” (Rehburg 1974, p. 221). Among the Southern Tairora, the “pervasive image underlying statements about the unity and solidarity” of the village is that of its men “as a solidary group that co-operates to perform the tasks on which the survival of the community is seen ultimately to depend....: protecting the village from military threats as well as through healing and crop and pig fertility rites that safeguard it from the external human and non-human forces that threaten the community’s health and food supply” (Mayer 1987, p. 99).

A second reason for supposing security groups to be primarily defensive units is that many did *not*, in fact, undertake offensive warfare. Among the Yangoru Boiken, the warriors of a village *never* combined to mount an attack: offensive actions were the precinct of a clan—or, more commonly yet, a subclan (which constituted the subsistence group)—if only because terrain and vegetation restricted the viable size of ambush parties and because the interests motivating attacks were never shared by every village member. Defensive actions, by contrast, *always* brought forth united village action: in the event of an attack, every capable village male rushed to defend those in jeopardy, while every available woman snatched up children and valuables and sought safety.

Likewise, among the neighboring Abelam, the village group was “a defensive but not necessarily an offensive unit” (Forge 1990, p. 162; see also, on the Au, Philsooph 1980, pp. 162, 304, 558). The component descent groups of Middle Sepik River villages could, and often did, act quite independently of one another in launching war, but “a village acted as a unit only for defence” (Harrison 1993, p. 66). Among the Manambu, for example, attacks “tended actually to be made by factions of a village, often in combination with external allies, rather than by a village in its entirety,” though the village “combined to defend itself as a last resort when under serious threat” (Harrison 1993, p. 68). The large, Arapesh village of Ilahita “was exclusively a *defensive* unit. To be sure, there were offensive operations, but these were always prosecuted by individual wards, or at most two or three wards in temporary partnership” (Tuzin 1976, p. 59, emphasis in original); “Ilahita’s constituent wards unanimously convened only when the village was under direct attack” (*ibid.*, p. 56). Among the Bena Bena, “a clan would respond defensively as a single unit,” but it “was a rare man who could actually mobilize an entire clan for a

⁷ Security group as (unspecified) military unit: *Chuave*—Warry (1987, p. 28); *Enga (Raiapu)*—Feachem (1974, p. 12); *Gadsup*—Leininger (1966, p. 93); *Gebusi*—Knauff (1985, p. 33); *Hewa*—Steadman (1971, p. 162); *Maring*—Clarke (1971, pp. 4, fn. 4, 24; Rappaport 1968, pp. 28, 111, 112); *Melpa (Central)*—Vicedom and Tischner (n.d., pp. 57, 58); *Mendi*—Ryan (1961, p. 14, 45); *Polopa*—Brown (1979, p. 713); *Telefolmin*—Brumbaugh (1981, p. 9); *Usarufa*—Bee (1974, pp. 133, 134, fn. 4).

raid, and in the cases I have heard described, the man who wanted revenge usually recruited only a portion of the clan to accompany him on his raid” (Langness 1971, p. 308). A final reason for concluding that defensive rather than offensive warfare was the foremost function of a security group is that, while many security groups served defensive but not offensive roles, there seem to have been none that acted as an offensive but not a defensive unit.

The Organization of Security: Security Groups, Security Structures, and Alliance Relationships

In a few New Guinea communities, defensive organization seems to have comprised a single security group. This was apparently the case among hunter-foragers such as the Sanio-Hiowe and Edopi: the subsistence group—the hilltop hamlet and clan longhouse, respectively—seems to have functioned also as a security group, its members moving together among their hunting and foraging grounds, as ready to defend one another from attack as they were to cooperate in subsistence procurement.

In most other societies, however, defensive organization boasted not one but two, structurally differentiated, security groups.⁸ This was the case for the Yangoru Boiken, where the village as a whole and each of the several clans that comprised it functioned as defensive groups. But why would a community need more than one security group? Inquiries in the field revealed that the dual structure was an adaptation to the different security challenges posed by daytime and nighttime routines (see also Roscoe 2008b). The clan functioned as the primary security group during the day, when villagers were obliged to disperse from their nucleated settlements to pursue their subsistence routines in the surrounding countryside; the village was the principal security group at night, when they returned to their settlements and, now in close proximity to one another, could act effectively as a single security group.

By the time anthropological fieldwork was underway in Melanesia, the social adaptations that warfare had forced on New Guineans had largely faded from ethnographic visibility. In 1980, for example, half a century after Yangoru had laid down the spear, gardening parties seldom exceeded the women and children of a subsistence group or two, accompanied—depending on the season—by a couple of men. People were insistent, however, that prior to contact subsistence had been a dangerous activity and that their routines then had been very different. In Yangoru’s dense tropical vegetation and heavily dissected terrain, it was comparatively easy for an enemy to take people unawares, waylaying them as they made their way to or from the gardens or creeping up on them as they worked in the garden itself. The best defense against these dangers was the capacity to muster an overwhelming military response, one that limited the damage an enemy could wreak and, by raising his own chances of being killed, perhaps deter him from attacking in the first place.

⁸ Nested security groups: *Asmat (Kawenak)*—Eyde (1967, pp. 68, 71, 278, 280); *Awa*—Boyd and Ito (1988, p. 53); *Gadsup*—Leininger (1966, pp. 87, 93); *Gahuku-Gama*—Read (1971, pp. 215, 216); *Huli*—Glasse (1968, pp. 23, 24, 34, 132); *Iwam (Sepik)*—Laszlo (n.d., pp. 71, 184; Rehburg 1974, pp. 220, 221); *Melpa (North)*—Strathern (1971, pp. 18, 20); *Mendi*—Ryan (1961, pp. 14, 45); *Tairora (Southern)*—Mayer (1987, pp. 29, 72, 88, 99); *Wahgi (North)*—O’Hanlon (1989, pp. 24, 28); *Wahgi (South)*—Reay (1959, pp. 35, 54, 113).

The clan was the “army” (as Yangoru informants put it) that sought to guarantee these consequences. Each clan averaged about 4.5 subsistence groups, some 25 members, and at the beginning of a new gardening cycle, these members arranged to clear adjacent strips of bush so that everyone could farm a single, large garden together. In times of danger, the entire clan proceeded to the garden *en masse*, a warrior vanguard scanning the path ahead, women and children in the middle carrying tools, produce, and infants, and the remainder of the warrior force following behind to protect the rear. Once they had reached the garden, the bulk of the clan’s warriors filtered off into the surrounding forest to act as sentinels, while women and older children, assisted by a few men, set to work on the day’s tasks. If enemies were sighted, the alarm was raised, and, as the women and children of the clan took to their heels, its warriors rushed to draw up a defensive line to block the assault and, if possible, surround and destroy the attackers.

Because clans were spread out across the countryside, they were too far apart to receive or render effective military aid to one another in the event of an attack. At dusk, however, things changed. Clan members returned to their settlement as they had gone out, in convoy, but because many more people could sleep in close proximity to one another at night than could farm the countryside communally by day, the clan could now combine with other clans to form a much larger security group, a village of some 125 to 250 people. By acting together as a single defensive unit, this village force could ensure a far greater and more devastating military response than any clan acting alone. Like ambushes during the day, attacks under cover of night came by surprise—usually at half-light, once attackers could see well enough to coordinate their assault and while their target was still asleep. When the enemy struck, those under immediate attack raised the alarm and attempted to hold their assailants off, while the rest of the village’s warriors rallied to their aid and attempted to sever the enemy’s lines of retreat (Roscoe 1996, pp. 651–653).

A Yangoru village, in sum, ingeniously folded together two types of security group: a village security group that protected against attack during the night, and the several clans that made up the village and protected their members against attack during the day. I shall refer to this sort of nested defensive organization (which corresponds in Fig. 1 with the community) as a *security structure*. The particular form of this structure found in Yangoru, the multi-clan village, was common throughout lowland New Guinea, and it is plausible to suppose that it functioned elsewhere much as it did in Yangoru. A similar but slightly different form was evident in other lowland areas and was exemplified by the Kawenak Asmat, a fisher-forager society on the southwest coast. Here, the segments making up a village are referred to in the literature not as clans but as men’s-house groups, or *jews*. As in Yangoru, though, these segments functioned as security groups when people were away from their village, out at their sago-gathering or fishing grounds (Eyde 1967, pp. 68, 71, 278). “Such an outing... provided protection for the entire group. Good warriors would remain in canoes up and downstream from the area where the group was working. They would give warning if the enemy approached. Other men accompanied the women into the forest to help with the work, but especially to protect them from ambushers” (ibid., p. 71). Occasionally, an entire village rather than a single men’s-house segment would undertake such an expedition, but the village principally functioned as a security group once its men’s-house segments had returned from their subsistence expeditions. Then,

“an attack on a settlement would bring the entire village to the defense of the component under attack” (Eyde 1967, p. 280). Similar adaptations seem to have characterized some eastern highland societies. At contact, for example, Gadsup and Southern Tairora communities comprised clans that seem to have lived on and exploited their own territories and yet positioned their stockaded settlements close enough together that they could render one another military aid in the event of an attack under cover of night (e.g., KTU 10-54/55 1955, p. 8; Leininger 1966, pp. 91, 93; Mayer 1987, pp. 29, 72, 88, 99).

A very different form of security structure characterized central highlands social organization. Here, a “tribe” (or “phratry”) segmented into clans (or “clan clusters” or “subtribes”) appears to have constituted the security structure, but, in contrast to the multiclan village of the lowlands, the larger security group—the tribe—was usually spread over too large an area to be effective in rallying against a surprise attack at night (see, e.g., Brookfield and Brown 1963, Maps; Burton 1988a, b, c; Meggitt 1965, pp. 3, 8, 224). Lacking systematic information on the organization of defense in this region, we can only speculate about its operation. It is plausible, however, that the structure of security was the reverse of that in the lowlands—*i.e.*, the smaller grouping (the clan, clan-cluster, or subtribe) served as the security group against attack by night, the larger (the tribe or phratry) as the security group against attack during the day. In contrast to the tribe, the clan (or clan cluster or subtribe) appears to have resided in sufficiently close proximity for its members to rally an effective mutual defense against nighttime attack. In contrast to the lowlands, however, a much larger force—the tribe or phratry—could rally to the defense during the day, when people were about their subsistence routines. This contrast in the defensive organization of highland and lowland communities can be attributed to environmental differences. Whereas lowland societies typically inhabited a landscape of dense vegetation and broken terrain or swamp, central highland communities were located on the lower slopes of grassy valleys, an ecology that conferred long lines of sight on the order of several kilometers. In consequence, it was exceedingly difficult for enemies attacking during the day to secure the element of surprise. Defenders could, quite literally, see them coming a mile off, and with this advance warning, several clans could rally as a tribe in mutual defense well before an enemy drew near.

Security structures constituted the largest functional units in New Guinea society; even so, they varied markedly in scale. Among hunter-foragers such as the Sanio-Hiowe and Edopi, where the security group was a single, unnested subsistence group, a security structure embraced no more than 20 or so people. At the other extreme, some fisher-foragers formed villages of 1,000 to 2,000 people, each containing several men’s-house groups, which in turn were made up of numerous subsistence groups (Roscoe 2006, p. 40; see also Held 1957, pp. 49, 50; Williams 1924, pp. 4, 75). Among central highland cultivators like the Chimbu and Melpa, clan security groups numbered in the hundreds, while the tribal security group often reached into the thousands (Bergmann 1971, vol. 1, pp. 35, 182, 1971, vol. 4, pp. 85, 88; Brookfield and Brown 1963, pp. 73, 85; Strathern 1971, p. 230; Vicedom and Tischner *n.d.*, pp. 8, 9, 49, 57, 65, 73, 88, 92, 94).

There was one further complication in the organization of New Guinea defense: security structures did not exist in isolation but rather were enmeshed in relations

with other, neighboring security structures (Fig. 1).⁹ In the ethnographic record, these relationships are commonly termed “alliances,” but this is a misleading term in so far as it conjures an image of relationships forged *to do something*, to advance some kind of collective action (such as attacking an enemy). In New Guinea, individuals or segments of a security structure certainly drew periodically on relationships with neighboring allies to prosecute offensive warfare, but this was an epiphenomenon of their association, not its cause. The principal goal of “alliance” was the mutual interest that neighboring security structures had in forging peaceful relations with those who, being their closest neighbors, posed their greatest existential threat (*e.g.*, van der Kroef 1952, p. 224). Where security structures aimed to defend members against attack, “alliances” aimed principally to suppress the threat of attack from a neighboring security structure. Only secondarily were they used to mobilize joint military action against enemies further afield.

Alliances were typically less stable than the security structures that forged them because the latter were too far apart geographically to render each other effective defensive aid in the event of an attack (Roscoe 1996, pp. 652, 658–660). Were this not the case, in fact, a balance-of-power logic would dictate that they form a single security structure not an alliance. Lacking the unifying force of common defense, alliances therefore lacked the stability of their component security structures. The peace they sought and the cooperation they occasionally managed was always contingent and problematic; and typically, as numerous sources observed, they were fluid arrangements, forming and dissolving though time with the vicissitudes of history and as the fortunes of diplomacy waxed and waned.

Although the clans, villages, tribes, and so on that constituted the macrostructures of New Guinea society clearly served the goal of mutual defense, the ethnographic record indicates that they also cooperated in a variety of other, mostly ceremonial activities. They sponsored the construction of spirit houses, for example, and they mounted feasts, pig-killing festivals, pig and long-yam exchanges, initiation rituals, and exhibitions of massed singing and dancing. It might legitimately be asked, therefore, why these groups should be described as *defensive* units rather than as, say, ceremonial or religious units? The answer, to which I now turn, is that the ceremonial activities of these groups were part and parcel of their security function. Cult-house construction, material distributions, performances of song and dance were a means of substituting symbolic violence for real violence, a tactic that was instrumental to managing conflicts of interest, thereby allowing these groups to operate as mutual defense organizations and to maintain a precarious peace with their neighbors.

⁹ Ethnographic descriptions of these diplomatic networks, or “alliances,” are too numerous to cite. References to typical networks among a hunter-forager group (Sanio) can be found in AMB 3-68/69 (1968, n.p.); a hunter-sago planter group (Au) in Philsooph (1980, p. 112); a sago-fish trading group (Iatmul) in Stanek (1983, pp. 48–50); a hunter-horticultural group (Tifal) in Cranstone (1968, p. 610); a pig-rearing horticultural group (Abelam) in Kaberry (1971, pp. 40, 63); and a pig-rearing agricultural group (Yale) in Koch (1974, p. 135). Sago eaters who depended heavily on fishing appear to have been the principal exceptions to the general rule that security structures forged extensive diplomatic relations with those around them: among these groups, “alliances” were commonly either minimal or very temporary, perhaps lasting no longer than the duration of a communal head-hunt.

Lethal Violence and the Social Order

The differences between social structure as it existed in contact-era New Guinea and as it is envisaged in Johnson's scalar-stress model should now be apparent. In Johnson's model, social structure is a response to scalar stress and it consists of a *hierarchy of decision-making individuals or institutions*. In New Guinea, however, social structure was a response to the problem of optimizing the achievement of multiple ends (reproduction, subsistence optimization, and security) and it consisted of a *nested set of collective actions*. Its simple but ingenious solution to this problem was to combine groups optimized to advance one kind of collective interest into larger groups optimally sized to advance another. Thus, a New Guinea clan exhibited complexity not because certain individuals drawn from its component subsistence groups formed a higher-level, decision-making social group but because its component subsistence groups, units that acted separately to promote subsistence optimization, also acted collectively to secure their common defense against the threat of daytime attack (see Fig. 3; note, alliance relationships to other communities have been omitted for clarity).

The difficulty with this modular solution to the optimality problem was that it generated a complex and conflicting overlap of competing and collective interests: individuals and groups within a nested structure shared common interests with regard to some collective actions, but they were simultaneously divided by more parochial interests with regard to others. In New Guinea, for example, individuals and reproductive groups belonging to the same subsistence group or the same security group shared interests in collaborating respectively in resource procurement and protecting against attack. Yet, these same individuals and reproductive groups were also potentially opposed to one another because of the conflicting interests they had in procuring mates, material resources, housing, and the like. Likewise, the security structures in an 'alliance' shared mutual interests in maintaining the peace and, to the extent, possible, cooperating in collective action against mutual enemies, yet at the same time they were potentially opposed to one another by conflicting interests in personnel and territory. The challenge—to a modular organization and the alliances it formed—was how to ensure that conflicting interests at a "lower" organizational level did not erupt into open conflict and lethal violence that would diminish or destroy the ability to advance collective interests at a "higher" level.

In Alexander's (1979, p. 240) view, judicial systems provide the resolution to this problem: "the function of laws is to regulate and render finite the reproductive strivings of individuals and subgroups within societies, in the interest of preserving unity in the larger group." This is certainly the case for politically centralized societies. Lethal violence that might disrupt the system is suppressed by centralized organs of power that claim a monopoly on the exercise of violence and manage conflicts of interest through elaborate systems of governmental control: legislative bodies that define legitimate interests and prescribe sanctions for infringing upon them; police systems that monitor and detect infringements; court systems that mediate, adjudicate, and resolve conflicts of interest; and penal systems that enforce court decisions and attempt to deter future infractions.

In small-scale, politically uncentralized societies, though, no centralized power exists to suppress lethal violence, and jural institutions are only minimally elaborated

and only modestly effective. In the absence of overarching mechanisms of detection, adjudication, and sanction, the principal and precarious means of managing conflicts of interest are claim and counter-claim, discussion and kin-group pressure, gossip, ostracism, and exclusion. These mechanisms are not without their effect, but in the absence of third-party systems of mediation, detection, and enforcement backed by a capital power, there would seem to be nothing to prevent conflicts of interest from spiraling out of control. What is to prevent one party or another from resorting to the ultimate legal sanction: self-redress in the form of physical violence? The dilemma facing small-scale society, it would seem, is that it can neither permit nor prevent the use of lethal violence in pursuit of individual and collective interest.

To resolve this dilemma, New Guineans—and by extension, I suggest, humans in small-scale society everywhere—appear to have deployed a solution similar to the “ritualized” fighting that evolved in many non-human species to reduce the morbid and mortal costs of conflicts over mates and resources (see above). They substituted symbolic fighting on a ceremonial plaza for actual fighting on a battlefield. Rather than take up arms and resort to dangerous or lethal combat, they instead took up material distributions, exhibitions of singing and dancing, and monumental architecture and resorted to symbolic combat, to displays that reliably communicated who would win a fight to the death without anyone having to engage in an actual fight to the death. By honestly *displaying*—rather than actively *deploying*—their military capacity, every individual, every subgroup, and every group in the system was able reliably to determine who would win a physical fight over a conflict of interest without any individual or unit having to risk the actual mortal combat that would jeopardize their individual interests in survival and their collective interests in cooperative action. If the deployment of military strength as lethal violence was a means of protecting and advancing individual and group interests vis-à-vis enemies *external* to a security structure, an honest display of fighting strength was a means of protecting and advancing the same interests *within* the structure and between allied structures without imperiling collective interests in security and peaceful relations.

Military Strength

To understand how groups went about displaying their fighting strength and why these displays assumed the particular forms they did, we must first examine what constituted military strength. According to Lawrence Keeley, who has done as much as anyone to pioneer an archeology of war, “the only universal ‘law’ of warfare” is: “larger numbers, fortifications, and better logistics will win, in the long run and in most cases, over unfortified smaller numbers with poorer logistics.....logistics are key because all military activities ultimately and immediately depend on them” (Keeley 2001, p. 335).

There is a lot to what Keeley says. New Guinea communities invested considerable effort in fortifying their settlements (Roscoe 2008b), and local armories were probably as lethal as cultural and technological constraints would allow. In addition, security groups and structures were obsessed with warrior numbers. A clan, I was told in Yangoru, should always have “plenty of soldiers”—*i.e.*, plenty of men “who could stand up and fight” for it. Birthing was one means of building up warrior numbers and was among the most important contributions that a group’s wives could

make to its military strength. But clans and villages were also continually on the look-out to attract and adopt young men from other villages who had few inheritance prospects in their own clans. Further afield, the Chimbu perceived “the manpower of each group” as “very important and the more people a group had and the more fighting men, the stronger they felt and the more respect others had for them” (Bergmann 1971, vol. 4, p. 61). Among the South Wahgi (or Kuma), the “prime secular value,” which gave “meaning and purpose” to life, was the “idea of a wealthy clan that is strong in numbers and strong in war” (Reay 1959, p. 151).¹⁰ People expressed concern if their numbers began to decline and underscored the importance of bolstering them. Among the Bahinemo, the “need” was “always for more people to band together for protection” (Dye and Dye Bakker 1991, p. 4). Au “villages as well as clans welcome outsiders in order to increase their numerical strength, which is necessary, among other things, for warfare” (Philsooph 1980, p. 333). Gadsup people, too, “were interested in maintaining strong and large warfare groups and in recruiting ‘big fighters’ into their patrilineal clans” (Leininger 1966, p. 102).¹¹ As in Yangoru, security groups valued women for the children they contributed to group strength. Each Gimi sib-village strove “to obtain as many wives as possible so as to perpetuate and strengthen itself through the children they bear” (Glick 1963, pp. 76, 77).¹² For the same reason, warriors showed no compunction about killing the wives of their enemies: as the Mendi put it, “women supply the enemy clan with children, and children grow up to be fighting-men who will one day attack us” (Ryan 1961, p. 233; see also Philsooph 1980, p. 146; Vicedom and Tischner n.d., vol. 2, p. 309).

In New Guinea, though, the foundations of military strength were also both more and less complex than Keeley’s “law” allows. They were less complex in that logistics were of minimal moment. Since the enemy was close at hand and military confrontations rarely lasted longer than a few hours, there was little call for elaborate supply lines: what food and arms warriors needed, they or their kin carried to the field themselves. On the other hand, the foundations of New Guinea military strength were more complex than Keeley allows in so far as they involved more than just fortifications, weaponry, and numbers. Military strength depended also on the

¹⁰ Strength in numbers, see also: *Abelam (Central)*—Kaberry (1971, p. 44); *Au*—Philsooph (1980, p. 403); *Awa*—Boyd and Ito (1988, p. 53); *Bun*—McDowell (1988, p. 127); *Duna*—Modjeska (1977, p. 68); *Gahuku-Gama*—Read (1965, pp. 70, 215, 221); *Gimi*—Bragginton (1975, pp. 53, 84, 85); *Gnau*—Lewis (1975, pp. 20, 21); *Iatmul*—Walstab (1924, p. 9); *Narak*—Cook and Pflanz-Cook (1988, pp. 78, 79); *Tairora (Southern)*—Mayer (1987, p. 66); *Wahgi (North)*—O’Hanlon (1989, p. 32); *Wahgi (South)*—Reay (1959, p. 33).

¹¹ Importance of and concerns about numbers, see also: *Abelam (Central)*—Kaberry (1971, p. 67); *Abelam (Wosera)*—Curry (1992, pp. 130, 135, fn. 5); *Amanab*—Juillerat (1996, p. 8); *Au*—Philsooph (1980, pp. 91, 92, 333, 403); *Bahinemo*—Dye and Dye Bakker (1991, pp. 4, 5); *Enga (Mae)*—Meggitt (1965, p. 15); *Gadsup*—Leininger (1966, p. 102); *Gimi*—Bragginton (1975, p. 53); *Gnau*—Lewis (1975, pp. 21, 25); *Gururumba*—Newman (1962, pp. 40, 65); *Jaqai*—Boelaars (1981, p. 22); *Kamoro*—Pouwer (n.d., p. 97); *Mendi*—Ryan (1961, p. 36); *Mianmin (East)*—Morren (1974, p. 116); *Mianmin (West)*—Gardner (1981, p. 96); *Tairora (Northern)*—Watson (1983, p. 193); *Telefolmin*—Brumbaugh (1981, p. 9).

¹² Women contribute children to group strength, see also: *Au*—Philsooph (1980, p. 146); *Gahuku-Gama*—Read (1965, p. 153); *Gimi*—Glick (1963, p. 76); *Jaqai*—Boelaars (1958, p. 114); *Melpa (Central)*—Vicedom and Tischner (n.d., vol.2, p. 309); *Narak*—Cook and Pflanz-Cook (1988, pp. 78, 79); *Wahgi (South)*—Reay (1959, p. 75, 1984, p. 34).

commitment and skills that individual warriors brought to the battle field, as well as on their ability to act cohesively as a military unit.

A warrior's individual ability and commitment was important because the military strength of his group was the aggregate of the "strengths" of its members. The more skilled they were, the more committed each was to defending it, the greater was its military strength. In Yangoru, commitment to and capability with the spear formed the core of a quality known as *halinya*, or "strength," the esteemed essence of what it was to be considered a man (Roscoe 2001, pp. 290–292). *Halinya* connoted physical strength, agility, and stamina, but also cognitive or psychological "strength" in the sense of courage, commitment, mental acuity, forcefulness, and determination. A man who was *halinya* radiated a dangerous potency, an aura that might colloquially be glossed as "Don't mess with me."

Women were also esteemed in Yangoru for the individual capacity and commitment they contributed to group military strength, but female "strength" was manifest in a different set of responsibilities. In defensive actions, women were vital to group strength not because they confronted the enemy (though a few did) but because they could thwart him. In the event of an attack, a woman was expected to grab her children and whatever valuables she could carry and, as the warriors of her group rallied to repulse the enemy, to dash for cover into the nearby forest or a barricaded house. As noted already, a woman also contributed to group strength by bearing children: her sons were the group's future warrior strength, her daughters a future source of the bridewealth that would secure more wives and yet more sons (Roscoe and Wais Roscoe 1988). By her "hard work" in her gardens or over her cooking fire, furthermore, a woman was crucial to provisioning the personnel of her group. On more than one occasion, I heard an elderly man subject a young, restless wife of his clan to a tirade of abuse that ended with the peroration, "So you just settle right down and get on with working hard [in the gardens] and bearing lots of children!"

Similar sentiments about the importance of individual "strength" recur throughout New Guinea. Among the Gnau: "Strength and readiness to use or face violent action, courage, steadfastness and loyalty were qualities required of men in the conduct of war, defence and dispute in old times" (Lewis 1980, p. 167). During initiation, Southern Tairora elders emphasized to the young men in their charge, "the importance of acquiring military skills, being courageous in the face of the enemy" (Mayer 1987, pp. 156, 157).¹³ As in Yangoru, women were esteemed for their childbearing and their subsistence work. Among the Gainj, a woman achieved status by proving herself "a good woman, a reproducer and producer who subordinates her body and will to her husband" (Johnson 1982b, p. 63). Women were especially valued if they produced "large numbers of children or notably large and healthy children", and if they were "known to be especially productive and generous gardeners" (ibid.). Among the Biaka of the Sepik, a wife was valued by her security

¹³ Individual male strength, see also: *Ama*—Guddemi (1992, pp. 14, 140); *Anga (Sambia)*—Herdt (1987, pp. 30–32, 101–104); *Awa*—Boyd and Ito (1988, pp. 52, 53); *Gadsup*—Leininger (1966, p. 88); *Gahuku-Gama*—Read (1959, pp. 427, 428, 433, 434); *Jaqai*—Boelaars (1981, pp. 89, 90); *Fore/Kamano/Usarufa*—Berndt (1962, pp. 173, 174); *Karawari*—Telban (1998, p. 58); *Koriki*—Williams (1924, p. 64); *Kwoma*—Bowden (1983, pp. 92, 93, 113); *Manambu*—Harrison (1993, pp. 106, 107, 109, 120); *Melpa (Central)*—Strauss and Tischner (1990 [1962], p. 138); *Tairora (Northern)*—Watson (1971, pp. 267, 268); *Waropen*—Held (1957, p. 66).

group because: “1) she adds to the work force, 2) alliances between clans are formed, and 3) children are added to the clan, and hence to the larger group” (Hamlin n.d., p. 42).¹⁴

In addition to the individual strengths of its members, a security group’s military strength depended also on their coordination, on their willingness and ability to submerge their individual agencies in that of the group and act cohesively *as* a group (see also Hagen and Bryant 2003, p. 29). Individual and numerical strength were of little military use if a group’s members were so riven by conflict that they were unwilling to coordinate their military actions or, worse, inclined to betray one another to the enemy. In Yangoru, enormous stress was laid on group unity: passionate ethics esteemed internal harmony, abhorred intra-group violence, and exalted the use of peaceful rather than violent means of advancing the former over the latter. In the days of war, older men told me, internal disputes and political rivalries were prosecuted in far more courtly terms than they are today for fear that they might otherwise erupt into violence. If a man was derelict in paying for a pig, his creditor did not broadcast the delict publicly as he would nowadays but spread his complaint informally to avoid publicly humiliating his debtor and provoking his ire. Big men, too, were careful to avoid openly “shaming” their rivals: rather than boast about their deeds and denigrate others as “rubbish men,” they were content to let their exemplary achievements speak for themselves. If, despite all restraint, intra-group conflict did flare up, cooler heads rushed to counsel fraternity and moderation, warning those involved that fighting would “break the clan apart” or declaiming that: “Distant enemies [i.e., enemy villages] you can fight. But fighting with clans in your own village is bad. They are close to!” If pre-emption and conciliation failed and physical violence did break out, the final defense against social disintegration was to blunt its mortal consequences. Rather than take up deadly arms, intra-village fights were confined to scuffles with sticks or barks of timber. Should things escalate and weapons be snatched up, they were wielded in comparatively harmless ways. The hardwood sword was used not in its lethal, edge-on configuration but flat-on so that it would stun but not kill an opponent. Spears were targeted on limbs or buttocks rather than on heads or torsos, while the deadly *minji* spear, with its wickedly opposed barbs, was “left at home” on its rack as “too much of a danger for this sort of [intra-village] fighting.”

As in Yangoru, so elsewhere. Mayer (1987, p. 94) was “constantly struck” by Southern Tairora “people’s emphasis on the role of the village as a military unit and on the notion that their survival depended on maintaining a strong and undivided fighting force and hence on minimising tensions and divisions among the village men.” Among the Abelam, “disunity within a village left it vulnerable to its enemies: there was a strong reprobation of fighting among fellow-villagers which might eventually lead to deaths, feud, and the splitting of the community into two separate

¹⁴ Individual female strength, see also: *Abelam (Central)*—Kaberry (1941/42, pp. 210, 213); *Alamblak*—Edmiston and Edmiston (1989, p. 46); *Gururumba*—Newman (1962, p. 109); *Kwoma*—Whiting (1941, p. 72); *Melpa (Kumdi)*—Brandewie (1981, pp. 45, 152); *Melpa (North)*—Strathern (1972b, pp. 133, 134); *Polopa*—Anderson (1985, p. 77); *Tairora (Southern)*—Mayer (1987, pp. 155, 157); *Wahgi (South)*—Reay (1984, p. 48).

villages” (Kaberry 1971, p. 67).¹⁵ If fighting did break out, fists and sticks rather than more lethal arms were the preferred weapons, and injuries were typically compensated afterwards to heal the breach. The inhabitants of different Kapauku villages within the same confederacy might “clash in a fight. However, they seldom fight with bows and arrows and the aim of the fight is not annihilation but rather a “settlement” of the affair. This type of fighting can be compared to a valve letting out surplus steam from an overheated boiler. It is an emotional rather than a premeditated outburst of violence which usually results in fighting only with sticks” (Pospisil 1958, pp. 88, 89). Among the Central Abelam, disputes within a village sometimes resulted in spear fights, but “since the hostile groups ultimately had to unite against enemy villages for purposes of defense, casualties were few and mechanisms were available to stop the fighting” (Scaglione 1976, pp. 96, 97).¹⁶

Finally, it might be thought, a group’s military strength should depend on one further factor besides numbers, individual strength, and cohesion: territory. Without abundant land and material resources, after all, a security group surely cannot subsidize the large numbers of warriors, producers, and reproducers required to sustain its military strength? As plausible as this proposition might seem, though, it has matters the wrong way round: territory is not a prerequisite for building military strength but rather the reason, *inter alia*, for building this strength. Ownership of a territory consists of the ability to live on it, exploit it, and punish those who infringe on it without sustaining unacceptable harm. To the extent a group’s members enjoy this security, others will be unable to displace them and they can be said to own the territory. To the extent that they are militarily disadvantaged, they will be forced to yield. (For this reason, it would be misleading to dub the security group a “resource-holding group” for this supposes that its principal goal was resource holding when, in fact, it was mutual protection of its members, with resource-holding a derivative of that goal.) Access to material resources, in sum, is not the prerequisite for a strong security group but rather its consequence. As the Mianmin and Melpa put it: “Ground is nothing, it is men who are strong” (Gardner 1981, p. 96; Strathern 1971, p. 35).

Fighting Strength and Social Order

In the hostile landscape of New Guinea, military strength was critical to a security structure’s survival and well-being. As Watson put it for the Northern Tairora, communities needed “to remain strong in order to remain at all” (Watson 1983,

¹⁵ Group harmony and group coordination, see also: *Awa*—Newman (1972, pp. 252, 313); *Chimbu*—Brown (1972, p. 43); *Melpa (Central)*—Vicedom and Tischner (n.d., vol. 2, p. 77); *Tairora (Southern)*—Mayer (1987, pp. 80, 95, 103, 130, 131, 156); *Wahgi (South)*—Reay (1987, p. 114); *Yalé*—Koch (1974, p. 72).

¹⁶ Conflict and avoidance of bloodshed within security group, see also: *Abelam (Eastern)*—Forge (n.d., p. 2); *Amanab*—Juillerat (1996, pp. 473, 497, 498); *Anggor*—Huber (1974, pp. 59, 90–94); *Asmat (Kawenak)*—Eyde (1967, p. 332); *Au*—Philsooph (1980, p. 90); *Enga (Kyaka)*—Bulmer (1960, pp. 215, 216); *Fore*—Glasse and Lindenbaum (1973, p. 365); *Gadsup*—DuToit (1974, pp. 61, 86, 87, 100); *Gimi*—Bragginton (1975, p. 130); *Hewa*—Steadman (1971, p. 219); *Kapauku*—Pospisil (1958, p. 108); *Melpa (Kaugel)*—Bowers (1968, p. 167); *Melpa (North)*—Strathern (1971, p. 26); *Mendi*—Ryan (1961, pp. 129, 230); *Polopa*—Brown (1979, p. 722); *Tairora (Southern)*—Mayer (1987, pp. 72, 93); *Wahgi (North)*—O’Hanlon (1989, p. 26).

p. 193).¹⁷ If military strength was key to survival against the enemy, however, its display was equally important to maintaining the defensive organization and alliances upon which security and a precarious peace respectively rested. By signaling their fighting strength to one another, the individuals and subgroups within a security structure could manage their conflicts of interest without eroding their ability to withstand attack by their enemies. By displaying their military strength to allied security structures around them, they could similarly maintain a sphere of peace with some of their neighbors.

The most authentic means of signaling military strength was to deploy it successfully against the enemy, those who lay beyond the security structure and the alliances in which it was embedded. A multitude of reasons motivated New Guineans to launch assaults against their foes, but success in an attack also served vividly to demonstrate their military strength. Enemies themselves were an important target for these signals, of course: by its military successes against one enemy, a group communicated its dangerous potency to the rest. Among the Gnau of the Sepik, for example, a reputation “for being fierce and for killing gave one security at home: people would not want to risk coming on a raid. This was cited as a benefit of being warlike and successful in killing people from the neighbouring villages” (Lewis 1995, p. 32; see also Leininger 1966, p. 96; Read 1959, p. 428). By the success of their attacks, however, people also signaled their military strength to audiences closer to home, to others within their own security structure and those in allied security structures nearby. Individuals and groups that proved themselves in warfare abroad encouraged deference from individuals and groups at home.

Where the home audience was concerned, however, military strength was signaled as much, if not more so, by non-violent displays as by military actions. These displays assumed three principal forms, which I shall categorize as conspicuous distribution, conspicuous performance, and conspicuous construction. Conspicuous distributions took the form of public prestation: feasting and gifts of food, live pigs, or wealth. Gururumba distributions were typical of many. Gifts were:

always displayed prior to presentation in a symmetrically arranged pile. In a small exchange such a pile might consist of a base made by arranging bundles of cut pieces of sugar cane arranged in a hollow square, a filling for the square consisting of several layers of different kinds of sweet potatoes and yams, and on top a bunch of bananas decorated with multicolored leaves. The whole pile might only measure three or four feet along each side and be intended for half a dozen recipients. At the other extreme are displays made by erecting a large square tower some ten to fifteen feet along the sides of the base and rising twenty-five or more feet into the air. This tower provides a framework for a huge pile of food and wealth objects, such as shells or pieces of cloth, whose combined weight would be several tons. Such a display would be distributed among three to four hundred people (Newman 1965, p. 54).

¹⁷ Importance of security group “strength,” see also: *Abelam (Central)*—Kaberry (1971, p. 44); *Bena Bena*—Langness (1969, p. 51); *Chimbu*—Brown (1972, pp. 43, 44, 47); *Enga (Mae)*—Meggett (1965, p. 232); *Enga (Raiapu)*—Feachem (1974, p. 14); *Gadsup*—Leininger (1966, p. 102); *Gahuku-Gama*—Read (1965, pp. 70, 71); *Gururumba*—Newman (1962, p. 33); *Jaqai*—Boelaars (1981, p. 22); *Kamano*—Levine (1977, p. 43); *Narak*—Cook and Pflanz-Cook (1988, pp. 78, 79); *Tairora (Southern)*—Mayer (1987, p. 81); *Wahgi (North)*—Reay (1959, p. 1910).

In the central highlands, conspicuous distribution also took the form of large, pig-killing ceremonies. In the mid-1930's, Fr William Ross, the first missionary to the Central Melpa, estimated that in the course of a single day the Mokei tribe slaughtered some 710 pigs. He described the scene on one of their 10 or so ceremonial grounds:

There were twenty-four platforms about three feet square raised a foot from the ground. A roaring fire on the platform was used in heating a dense mass of stones which popped in the heat with a rifle-like report. There were as many fire pits as platforms. These pits were three feet deep and a foot and a half wide, and as we passed down the narrow park we had to rub our eyes free from smoke to avoid falling in the pits.... We sought relief in the cool of the big trees outside the dancing ground after counting sixty-eight pigs either roasted or ready to be roasted (Ross 1937, p. 84).

The second form of display, conspicuous performances, commonly accompanied pig killing festivals and initiations. These were large, elaborately choreographed exhibitions of singing, dancing, and music mounted by spectacularly decorated performers. Among the South Wahgi (Kuma):

It is to the glory of an individual and his clan that a man should be splendidly dressed at this time. The wealth hung about his body in the form of plumes and shells represents the wealth of his clan.... Kuma ceremonial acts out the desired results: strength and prosperity. Blatantly, aggressively, the men sound their flutes on still evenings so that the hooting will be heard all over the valley and people near and far will know that this clan is getting ready to kill its pigs. Members invite friendly clans to join them in making a bigger display than they can manage alone, and in the daytime up to 700 or 800 hand-drums may be pounded in unison. An equal number of voices proclaim oblique little songs sung over and over in a strident rhythm, and heels pound the earth in the monotonous concertina movement of the dance. The clanspeople who own this earth are busy attracting new friends and intimidating old enemies (Reay 1959, p. 141).

Conspicuous construction, the third type of display, involved the construction of great ritual structures that archeologists might term monumental construction if it were not that the products were of wood rather than stone. Among the Yangoru Boiken, these buildings took a relatively modest form. Every 15 years or so, a clan, or occasionally a moiety, would construct a *ka nimbia* "spirit" house, a tetrahedral structure some seven to twelve meters high, boasting a large cantilevered façade decorated with a profusion of graphic and plastic art (Roscoe 1995a, Fig. 1). Elsewhere, conspicuous constructions were far grander. The neighboring Abelam built cult houses similar to those of the Yangoru Boiken, but theirs were typically twice or even three times as large (Hauser-Schäublin 1989, pp. 68–147). On the south coast of New Guinea, Bevan (1890, p. 243) observed cult houses some "three hundred to four hundred feet in length—built on piles, and towering to a height over one hundred feet from the ground." Some idea of the material and labor invested in these structures can be obtained from an Australian patrol officer's description of a Kambot cult house measuring 54-m long, 14-m wide, and 16-m high. Its walls

contained 486 strips of black-palm spathe, each about 7-m long. Its posts and beams included two at 26-m long by 60 cm in diameter, two at 26 m by 30 cm, six at 16 m by 60 cm, 12 at 14 m by 60 cm, 36 at 5 m by 45 cm, 24 at 12 m by 40 cm, and 68 at 8 m by 23 cm. It was thatched with a total of 9,572 sago-leaflet tiles, each 2 m long. Another cult house in the neighboring village of Korogopa was almost 20% larger (ANG 10-46/47 1947, p. 3).

Although individual *military* skill and bravery might be knowable only through action on the battlefield, these displays provided authentic signals of every other component of a group's military strength. The quantities of food, pigs, and other valuables mustered in a material distribution; the scale, intricacy, synchronization, and duration of a conspicuous performance; and the sheer size and rococo artistry of a cult house signaled the size and commitment of its sponsoring group, the number of kin and allies willing to support its projects, the individual commitments and abilities of all these individuals, and their capacity to suppress their individual interests in order to work together and organize a large-scale action. As Newman observed of the Gururumba food and wealth towers:

it takes a great deal of planning, work, and coordination of effort to erect one of these displays, even a small one... the men who put them together are proud of their accomplishment. The displays are not simply of accumulated riches; they are displays of the capacity to be productive and energetic. This is explicitly recognized in the speeches made at the time the displays are presented. Speakers for the host group extol the strength and vitality of the group or individual acting as host, and speakers for the guest group also recognize their proficiency (Newman 1965, p. 54).

Likewise, the Chimbu pig-killing festival:

is the high point of Chimbu tribal collaboration, display and prestige. All the members are decorated with feathers, shells and other finery and they display the pride of the tribe: their young men, their young girls, their valuables and their productive capacity in the quantity of pork which they can give away. It demonstrates the strength and wealth of the tribe to visitors, observers and recipients from all other tribes (Brown 1972, p. 50).¹⁸

Material distributions were especially flexible modes of signaling. As the Gururumba example illustrates, they lent themselves as much to small-scale presentations (as between reproductive groups or between subsistence groups) as to the far larger displays that clan, tribe, and village security groups might mount. They were also combinatorial, allowing large-scale distributions simultaneously to signal the strengths of the smaller reproductive, subsistence, and security groups that had contributed to them. In Yangoru, for example, the large material distributions with which a village security group celebrated initiations, honored the recently dead, and sought to rejuvenate the earth were customarily arranged so that the

¹⁸ Feasts and material distributions as indexing strength, see also: *Chimbu*—Brown (1972, p. 47); *Enga (Mae)*—Meggitt (1965, pp. 232, 233); *Gahuku-Gama*—Read (1959, p. 428); Gururumba—Newman (1962, pp. 33, 34, 131, 133); *Mendi*—Ryan (1961, pp. 205, 206); *Narak*—Cook and Pflanz-Cook (1988, p. 79); *Upper Tor groups*—Oosterwal (1963, pp. 83, 85); *Wahgi (South)*—Reay (1959, p. 141); *Yangoru Boiken*—Roscoe (n.d.a).

contributions of individual reproductive, subsistence, and clan security groups were as evident as the village total—signaled by the designs on feasting pots, by the order in which food and shellwealth were lined on a ceremonial plaza, and by descent-group insignia and official declarations that accompanied pig prestations.

Conspicuous performance and conspicuous construction were less adaptable broadcasting media. The individual and subgroup identities of those contributing to an exhibition of song and dance were typically obscured by facial paint and by aesthetic demands for a uniform and synchronized choreography (e.g., Mettgoff 1985, pp. 68, 69; O’Hanlon 1989). Cult houses lent themselves even more poorly to communicating the contributions that individuals and subgroups had made to their construction. Conspicuous performances and constructions appear instead to have been deployed to signal the strength of security groups rather than of individuals, reproductive groups, or subsistence groups. Conspicuous performances signaled the size of a group by their scale and volume. Among the Gainj, for instance, ceremonial dances “enabled each parish to make a statement of its current male strength, of its capacity to defend its people and its territory” (Johnson 1982a, p. 44). As Hagen and Bryant (2003) hypothesized, moreover, they also credibly communicated both the motivation and the ability of group members to act collectively. Thus, among the Southern Tairora, the men of a village were “described as people who sing ‘well’... together. Such statements refer to the singing of war songs and male initiation songs known only to men. The ability of village men to sing these harmoniously in unison is represented as an indication that they are committed to co-operating as a military unit as well as in other ways” (Mayer 1987, p. 99, 100).¹⁹

Conspicuous constructions served similar goals. The great spirit houses of the Purari Delta on the south coast “were a true indication to the visitor of the size of the village and its population” (Holmes 1924, p. 93). Among the Yangoru Boiken, the construction of a *ka nimbia* spirit house was explicitly spoken of as a means by which clans “competed” to demonstrate their “strength” to other clans and other villages. Episodes of construction occurred in competitive bursts: a clan and its allies would embark on a structure, and this would goad others to follow suit—a “competition,” as people put it, “to see who would emerge victorious.” A clan that failed to make a showing could expect thereafter to be impugned. If it sought to dispute another clan, for example, it would quickly find itself humiliated by mock spear charges and derisive cries of: “Where is the leader who constructed your *ka nimbia*? What are you doing coming to be cross here? Go on, get out!” (Roscoe 1995a, p. 6).

Signaling theory has yet to explore in detail the nature of the channels through which such signals were broadcast. The New Guinea evidence indicates, however, that there were at least two forms, one virtually impossible to fake, the other more vulnerable to deception. The first channel involved the broadcast of highly reliable, “cognitive” information about individual and group strength. Material, performative, and architectural displays were, as signaling theorists have termed it, indexically related to the qualities they signaled. As direct objectifications of a group’s size, and

¹⁹ Singing and dancing as indexing strength, see also: *Auyana*—Robbins (1982, p. 226); *Gahuku-Gama*—Read (1959, p. 428); *Gururumba*—Newman (1962, p. 276); *Upper Tor groups*—Oosterwal (1963, pp. 83, 85); *Wahgi (North)*—O’Hanlon (1989, pp. 111–123); *Wahgi (South)*—Reay (1959, p. 141).

the commitment, coordination, and capabilities of its members, it was simply impossible for individuals or groups to mount a superior display if they did not, in fact, possess these qualities and, hence, a proportionate military potential.

Some displays, however, deployed an additional medium to communicate group strength, one that we might term the affective or “aesthetic” channel. Not only did they *demonstrate* strength to an audience, they also made that audience *feel* it. In the quantity of materials, coordination of labor, and engineering skills it embodied, for example, the Yangoru Boiken cult house provided information about the dangerous potency of the clan that sponsored it. But the structure was an aesthetic as well as a purely material object, and if we are to judge from informant reports, it communicated at an emotional as well as an informational level. By deploying a sophisticated array of artistic devices that included bristling arrays of spears, the morphology of a looming, predatory bird, and an iconography that conjured images of predatory eyes, teeth, and claws, it evoked in its audience the *feeling* of a powerful and dangerous presence (Roscoe 1995a, pp. 8, 9; see also Gombrich 1982, pp. 25, 26). In a comparable vein, Donald Tuzin detected a “numinous” quality in the performances that accompanied the construction and use of Ilahita Arapesh spirit houses. The sounds of the slit-gongs, bull-roarers, flutes, pipes, and trumpets that the Arapesh play—and that they describe as the “voice” of the *tamberan* spirits incarnated in the cult house—evoked “stunning,” or “weirdly disturbing” feelings and the presence of a “chillingly immense” voice (Tuzin 1984, p. 582). Similarly, through the thundering precision of their dancing, the soaring roar of their songs, and the play of light on their blackened and oiled skin, the conspicuous performances of the central highlands seem to have been striving not just to demonstrate military strength but also to “intimidate” or leave an audience “petrified” (e.g., O’Hanlon 1989, p. 89; Reay 1959, p. 141). These aesthetic communications are highly effective, but they may be less reliable an indicator of military strength than their “cognitive” counterparts. The emotional impact of an artistic innovation, a novel choreography, or a chilling new harmony has no necessary correlation with military capacity. As a result, a well chosen aesthetic device may create in an audience the feeling of a dangerously potent presence that is out of proportion to the actual military strength of its sponsors. Since apotropaic artistry is a common feature of monumental architecture, further research on this form of signaling would seem to be warranted.

Military Display and Symbolic Warfare

In her well-known historical ethnography of the Kwakiutl potlatch, Codere (1950, pp. 118–129) observed that this institutionalized “fighting with property” had expanded with the decline of North–west Coast warfare following contact. “When I was young,” she quotes an old Kwakiutl man as saying, “I have seen streams of blood shed in war. But since that time the white man came and stopped up that stream of blood with wealth [i.e., potlatch goods]” (ibid., p. 129). Similar comments are to be found in New Guinea. Commenting on the expansion of long-yam exchange following contact and “pacification,” older Abelam frequently told Kaberry (1941/42, p. 344): “Now we no longer fight our enemies with spears; it is taboo; now we only fight with yams” (see also Young 1971, p. 223).

In New Guinea, however, social signaling—the substitution of symbolic for real warfare—was not just a post-contact response to the impress of colonial “pacification.” Long before New Guineans ever engaged foreign nations on their soil, they had been using social signaling as the key to *creating* social organization in the first place. By substituting symbolic violence for actual violence, ceremonial displays dampened, so to speak, the consequences of conflict within a modular security structure or an alliance, allowing the autonomous members and component groups within these systems to coordinate their actions and advance collective interests in matters such as reproduction, subsistence, and security against their enemies.

New Guineans, it transpires, were well aware of this critical symbolic equivalence at the core of their sociality. The Yangoru Boiken, for instance, explicitly conceptualized their gifts of food, shell wealth, and pigs as hails of symbolic “spears” hurled at symbolic “enemies.” Transferences of shell wealth, for example, were explicitly spoken of as symbolic spears (lit. “spears underneath”), different types of shell ring representing different types of spear. Often, the equivalence was ceremonially enacted. A man who had just laid a wealth payment before its recipients would sometimes turn and, in a series of consecutive charges, hurl several spears into the bush or the thatch of a nearby house, the number and types of spear symbolizing the number and types of ring he has just presented. Pig exchange—“fighting with pigs,” as it was called—provided an even more elaborate and explicit symbolic battle (Roscoe 1989, pp. 223, 224; n.d.b). The two exchange moieties of a village were named after the two war confederacies, Lebuging and Samawung; ceremonies were mounted under the auspices of the *hwapomia*, the hereditary leader of clan warfare; the act of presenting a pig was spoken of as a “spear” thrown at an “enemy”; as the hapless hogs lay bound to their poles on the ceremonial plaza, they were said to represent the bodies of fallen warriors; and when they were dispatched, it was with a blow to the side of the head, just as the war sword was used to smash the skull of a wounded enemy. Similar military imagery accompanied distributions of pigs and wealth throughout New Guinea: thus, ceremonial prestations were spoken of as “fighting” or as a “battle” in which givers “wound” or “strike” receivers with gifts identified as weapons or “blows.”²⁰ As Strathern (1971, p. 129) put it of the valuables that flowed in Melpa exchange ceremonies, “moka gifts are a true functional alternative to warfare.”

Dancing, singing, and other conspicuous performances were also styled as “fights” or “combat,” with especially well executed performances said to “violate,” “attack,” “assault,” or “kill” their audiences.²¹ Among the allied communities of the Upper Tor, for example, dancing was:

part of the power fight. Suddenly, the Naidjbeedj men... stormed onto the village piazza. In the left hand, they held the “tifa” [handdrum], with the right,

²⁰ Material distributions as fighting: *Abelam (Central)*—Kaberry (1941/42, p. 344); *Kalauna*—Young (1971); *Kewa*—MacDonald (1991, p. 190); *Melpa (North)*—Strathern (1971, pp. 54, 95, 129); *New Guinea (General)*—Strathern (1985); *Nopuk*—Oosterwal (1967, pp. 171, 173); *Polopa*—Brown (1979); *Urat*—Allen (1976, p. 42); *Upper Tor groups*—Oosterwal (1963, p. 83); *Waropen*—Held (1957, pp. 165, 226).

²¹ Performance as fighting: *Gahuku-Gama*—Read (1955, p. 273); *Gururumba*—Newman (1962, p. 316); *Manambu*—Harrison (1993, pp. 113, 121, 122); *Maring*—Mettgoff (1985, p. 68); *Rappaport* (1968, pp. 195, 196); *Nopuk*—Oosterwal (1967, pp. 173, 174); *Samarokena*—van der Leeden (1962, pp. 98, 99); *Tairorora*—Watson (1971, p. 244); *Upper Tor groups*—Oosterwal (1963, pp. 87, 88).

they drummed. With wild springs, they “danced” from one end of the piazza to the other. By this, they wanted to challenge the Bora-Bora to seize their drums and take up the fight with them....During this, they called, “Waba, Waba, Waba” and other war calls. Four jumps forward, four back. So flowed the attack back and forth (Oosterwal 1963, p. 87, my translation).

Among the Yangoru Boiken, I never heard *ka nimbia* construction explicitly spoken of as an act of symbolic war, but the project was surrounded with an aura of metaphoric violence. It was constructed under the formal direction of its *hwapomia*, the clan’s hereditary war leader. The completion of each phase was celebrated with a *lumohlia*, the triumphant, night-long festival of singing and dancing that celebrated kills in war. And when the final structure was complete, its cross-pieces and eaves were fitted out with rows of war spears that raked down and out over the audience below. Tuzin (1980, p. 121) has noted the resemblance of the Ilahita Arapesh spirit house to “some bird-of-prey brooding over a clutch of fledglings—an image protective and yet menacing.” Visitors to a Kiwai *dárimo* stood in awe of it “as of something mysterious and dangerous” (Landtman 1927, p. 21). Likewise, the final of a Iatmul spirit house was a carved eagle, a “symbol of the aggressiveness and the warlike strength and boldness...of the village” (Wassmann 1991, p. 15).

Free-Riders and Political Leaders

Social Signaling and the Free-Rider

The final challenge facing the organization of small-scale society is the one with which we began: the free-rider problem. For the smaller components of New Guinea society, those on the scale of reproductive and subsistence groups, collective action theory already provides plausible explanations as to how this problem was resolved. By collaborating in biological and social reproduction, the members of a reproductive group likely ensured genetic payoffs sufficient to ensure their cooperation (Hamilton 1964). Given the small size of subsistence groups—on the order of ten to 20 in total (Table I) or about five to ten adult actors—it is plausible that the material payoffs of subsistence cooperation coupled with the capacity of a small group, through direct reciprocity, to tally contributions and exclude defaulters was sufficient to deal with those who might try to free-ride on subsistence activities (Trivers 1971).

For collectivities on the scale of a security group, however, free-riders are a far more serious challenge. In New Guinea, these groups could number in the hundreds if not thousands, far beyond the capacity of close genetic relatedness or direct reciprocity to manage defaulters. What ensured, then, that the warriors in a defensive group would defend one another in the event of attack if, by doing so, they placed themselves in mortal jeopardy? If material, performative, and architectural displays of military strength were the means by which individuals and subgroups managed conflicts of interest in service of larger-scale collective action, what was to prevent some from shirking their contributions to these displays, forcing others to shoulder the burden?

To institute collective action reliably, there must be: (a) extremely strong fairness norms, (b) third-party enforcement, or (c) some mechanism linking contributions to collective action and benefits at the individual level. A social signaling system recruits the latter solution: essentially, individuals and subgroups that contribute more to the collective action of the groups and structures to which they belong gain in two ways that encourage their participation. First, they secure for themselves a greater proportion of whatever rewards are available (mates, resources, *etc.*). Second, in doing so, they honestly signal qualities (fighting ability, industriousness, management skills, *etc.*) that make them both valued allies and mates and also formidable competitors; it is, therefore, in the interests of other individuals and subgroups preferentially to ally with, or defer to, them (*e.g.*, Smith and Bliege Bird 2005).

Consider, for example, the situation that existed at contact among the Yangoru Boiken. Each local system comprised several multiclan villages (*i.e.*, security structures) linked to one another by alliance and surrounded by several other similar systems with whom they were at war. Organized around social-signaling, each system was predicated on the axiom that those individuals and groups that consistently signaled superior military strength would prevail in competition for mates, resources, and the like. Within each system, therefore, a village security structure that demonstrated its superior military strength through display and in war could expect to prevail over other security structures in the system in gaining access to whatever mates, resources, and other rewards were available to the system as a whole. Within each village security structure, in turn, a clan security group that demonstrated superior military strength was deferred to by other clans in the village in contests for whatever rewards were available to the village as a whole. Within each village security structure, in turn, those clan security groups that demonstrated superior military strength were deferred to by other clans in the village in contests for whatever rewards were available to the village as a whole. The same logic applied to the subsistence groups within each clan security group and the reproductive groups within each subsistence group: those groups that displayed superior military strength would prevail in competition with their peers for mates, resources, and the like. Conversely, those who fell short found themselves closed out of disputes by the cries of stronger rivals: “Where are the pigs you gave to ‘fight’ for this land?” “Where is the wealth you gave to buy this woman’s menstrual blood? All you gave was rubbish off the ground!”

The result was an incentive structure that motivated individuals to contribute as much as they could to the strength of the reproductive, subsistence, and security groups and structures to which they belonged. By doing so, they increased the capacity of these groups and structures to gain access to whatever goods and services were available; by successfully signaling their own superior “strength,” they simultaneously secured for themselves privileged access to these increased returns since others would defer to the strength they demonstrated; and by demonstrating their “strength,” others would preferentially ally with them (providing them, for example, with mates). There was no net profit to defaulting. First, those tempted to free-ride undermined the capacity to secure rewards of the reproductive, subsistence, and security groups and structures to which they belonged, thereby reducing the overall share of returns to which potentially they had access. Second, by free-riding, they eroded their own reputation for strength and hence their ability to secure access to whatever rewards their group managed to retain. Finally, by defaulting in the

physical defense or symbolic displays mounted by their groups, they established personal reputations as “weak” (in Yangoru, *fatchik*: literally, “one who is lost in the bush”). As a result, they were obliged to defer in conflicts with others over mates, resources, and the like, and they were harder pressed than others to secure social support.

Social Signaling and Political Leadership

A social signaling system, in sum, resolved both the conflict-of-interest problem and the free-rider problem. More than this, though, its operation created an evaluative schema that illuminates some puzzling features of leadership in politically uncentralized communities like those of New Guinea. To begin with, it accounts for the curious mixture of esteem and censure in which New Guineans held their leaders (Roscoe 2000, p. 106). Sahlins (1963) hinted at this ambivalence in his landmark study of big-man societies. On the one hand, a big-man and his followers share a mutual interest in his rise for, as they help him, so he can help them. On the other hand, as he rises, he increasingly extorts their economic production, leaving them ultimately to the cold comfort of “eating his renown” (ibid., p. 293). Sahlins’s explanation of this ambivalence in terms of a “Melanesian contradiction” is now recognized as problematic, but the conflicting attitudes he identified are nonetheless very real. Among the Yangoru Boiken, I frequently heard people (especially women) mutter that the big-man to whom they deferred and to whom they commonly turned for help was “no good; he shouts at us, he’s always making trouble, always telling us to do this and that.” Similarly, dissonant attitudes were even more apparent in regions characterized by despotic leadership (Roscoe 2000, pp. 90–92). Because he was such a formidable warrior, for example, the Northern Tairora valued their despotic leader, Matoto, as the “one on whom all the rest lean”; yet, his descendants also remembered him as “a terrible man...half good, half bad” (Watson 1970, pp. 9, 11). Bergmann (1971, vol. 1, p. 195) remarked that Chimbu big-men were “highly esteemed,” but far from being liked, they were feared. (See also Read 1959, pp. 433, 434; Reay 1959, pp. 129, 130; Telban 1998, p. 58.)

Contradiction and ambivalence, though, are inherent in the way a social signaling system structures its internal relationships, whether among its component subgroups or its individual members. On the one hand, the system creates a *dominance* hierarchy that generates antagonism: those individuals and subgroups who prove themselves the strongest of the strong get to advance their interests over others, while those who demonstrate inferior strength—followers—are obliged to defer. On the other hand, the system creates a *moral* hierarchy that generates approval: those individuals and subgroups who contribute most to the military strength of their groups are esteemed by co-members because, by their actions, they advance the capacity of these groups to prevail in competition with others. Small-scale societies are ambivalent towards their leaders, in other words, because as the strongest of the strong, these individuals contribute to the well-being of all while simultaneously advancing their own interests at the expense of everyone else. At the risk of stretching cross-cultural translation too far, followers are obliged to console themselves with the thought that: “Well, he’s a real S.O.B, but at least he’s *our* S.O.B.”

As a system that evaluates individuals based on their contribution to collective military strength, a social signaling system also brings analytical coherence to the seemingly disparate qualities that characterized successful leadership in contact-era New Guinea. There were, of course, many dimensions to New Guinea leadership, and I have detailed elsewhere the interests that motivated leaders and the strategies through which they competed to accumulate prestige and power (Roscoe 2000). What we lack, however, is a coherent theory that accounts for the *constitution* of political action, a theory that explains why some actions were politically valued and brought prestige and power while others did not.

On their face, the qualities that conferred leadership in New Guinea comprised an extraordinary jumble of traits and skills: courage and proficiency in war or hunting; talented oratory; ability in mediation and organization; a gift for singing, dancing, wood carving, and/or graphic artistry; the ability to transact pigs and wealth; ritual expertise; and so on (*e.g.*, Roscoe 2000, pp. 87–94). But why ever should it be these particular traits and skills that bestowed dominance and attracted esteem, especially since they seem to have so little in common? Why not others? What do these qualities share that makes them politically valuable when other aptitudes and activities are not?

The answer lies in the axiom around which a social-signaling system revolves: the manifestation of military strength—in military action on the battlefield and through display on the ceremonial plaza. Leaders were those who proved themselves the strongest of the strong and who made the greatest contributions to the real or symbolic deployments of military strength mounted by the groups to which they belonged. What these qualities shared is that they were all, in different ways, critical to mustering this strength. Courage and capability in war was perhaps the most widely valued leadership quality and the most obviously related to military strength (*ibid.*, pp. 89, 90): by his superior courage and ability in war, a leader enhanced the military strength of every subgroup and group in the system to which he belonged. A great hunter also contributed to this strength, albeit in less direct ways: he provided high-quality protein (and hence strength) to others in his groupings; the game he brought in was crucial to the scale of the feasts they could mount; and the pursuit of the most elusive and dangerous species—wild pigs, cassowaries, crocodiles, and sharks—was a proxy for warrior courage and ability (*e.g.*, Lewis 1980, p. 168; Riebe 1974, p. 425, fn. 2).

A big-man depended on rather different talents for his rise to eminence, but these too were crucial to the strength of the groups to which he belonged. His talents for oratory, mediation, and organization were instrumental in reducing their internal conflict and enhancing the ability of their members to coordinate their actions as a group. His facility in amassing food, pigs, and wealth for distribution allowed him to build power by indebting others, but the reason why this ability was prized by the groups to which he belonged was that it magnified the conspicuous distributions that objectified their strength. In other contexts, the stamina and talent that a leader might exhibit in singing and dancing were esteemed for their contributions to conspicuous performances that communicated his group's military might; his skills in the visual and plastic arts were valued for their contributions to its monumental constructions; and his ritual expertise in initiation was appreciated because it produced—or, rather, was believed to produce—“strong” young men and women for the group, while his

proficiency in curing ritual was esteemed for its putative capacity to restore the group's members to health.

Nor were women disenfranchised from this politics of strength. Like their menfolk, they too gained prestige for their capacity and ability in the contributions that they made to group "strength": *i.e.*, child-rearing and material production. Those women who produced more children than others, who worked harder in their gardens and over their cooking fires, who were the most skilful and industrious in pig-rearing, these were the women who gained eminence over others because of the contributions their achievements made to the "strength" of the reproductive, subsistence, and security groups with which they were affiliated.²²

Conclusion

This paper has sought to construct from the New Guinea ethnographic record a model of small-scale society that might help synthesize what we find in the archeological record. Lacking archeological expertise as I do, and pressing in any case against the constraints of available space, it would be neither wise nor feasible to attempt a detailed exposition of how the model might be applied to archeological practice. Nevertheless, in summarizing the argument, it may be useful to indicate a few of the ways in which it could be used to interpret the archeological record and to advance an archeology of small-scale society.

The model offers to inform and analytically integrate three important characteristics of small-scale society. The first of these is the "segmentary" form these systems assume. Burdened with the cultural freight of a nation state, which presents sociality as a "natural" fact—the inevitable precondition for escaping the "Warre Of Every One Against Every One"—we think of society as a single, autonomous "imagined community" (Anderson 1991). This image is problematic enough as a representation of the nation-state: as the motto, *E pluribus unum*, testifies, for example, the USA may be thought of as equally one group and 50 federated groups. As a representation of small-scale society, though, the image is even more questionable. From an analytical perspective, small-scale society should be considered not as a single social entity but as a nested assemblage of several such entities, each dedicated and optimally sized to discharge some particular instrumental role, be it reproduction, subsistence optimization, defense, or some other function.

Haas (1990, pp. 176, 177) and Adler and Wilshusen (1990) have indicated some of the ways in which this kind of functionally differentiated, segmentary structure might be investigated archeologically. But the archeological implications of warfare in this model also merit emphasis. The antiquity of war is currently a matter of sharp disagreement: archeologists tend to attribute a long chronology to human fighting (*e.g.*, LeBlanc 2003; Keeley 1996; see also Roscoe 2007; Wrangham 1999); social anthropologists are more inclined to see war as a product of the Holocene or of even

²² Female prestige: *Gainj*—Johnson (1982b, p. 63); *Melpa (Kumdi)*—Brandewie (1981, pp. 45, 152); *Melpa (Northern)*—Strathern (1972b, p. 133); *Wahgi, South*—Reay (1984, pp. 46, 48); *Yangoru Boiken*—Roscoe (1995b).

more recent times (*e.g.*, Ferguson 1997, 2006; Fry 2006; Kelly 2000). Whenever it was that warfare appeared, however, a social-signaling model would predict a major organizational impact on society. In the absence of war, social organization would likely consist of small subsistence groups, linked perhaps to other, like groups through trade networks or connubial relations among their component reproductive groups. The emergence of war, however, would be transformative, forcing these smaller groupings into larger organizational structures on the scale of clans, men's house groups, villages, and tribes. (Conversely, it follows that archeological evidence for the presence of enduring groups larger than those required for subsistence optimization should be considered potential signatures for the presence of war.)

The second aspect of small-scale society that a social-signaling model informs is its ceremonial life. If a modular social construction is to cohere, its individual members and component subgroups are obliged to manage their conflicts of interest by substituting symbolic fighting for real physical violence. By *displaying* their military strength rather than resorting to it in physical violence—by establishing through display who would win a fight to the death without actually resorting to one—the individuals and subgroups within a nested social structure not only avoid the physical costs of violence to themselves but they are able to maintain the cooperation on which they depend for more expansive collective actions such as subsistence cooperation or defense against their enemies.

With the emergence of warfare, we might expect these displays to undergo marked elaboration as subsistence groupings are obliged to articulate themselves into security structures and security structures into alliance networks. These conclusions have implications for interpreting those aspects of ceremonial life such as feasting (Dietler and Hayden 2001; Potter 2000) and monumental architecture (*e.g.*, Adler and Wilshusen 1990; Neiman 1998; Trigger 1990) that leave archeological signatures. These practices, now widely recognized, are political as much as they are religious, but a social signaling model pinpoints their *raison d'être* and their structural articulation: the competitive display of military strength by individuals and subgroups within a security structure and by security structures within an alliance. (See Roscoe (1995a, pp. 15–17) and Tuzin (1984) on how the religiosity associated with these displays ultimately may derive from their political affectivity.)

The final dimension of small-scale society that a social-signaling model illuminates are the grounds of the cultural schema of personal and political worth that it imposes on its members. In such a system, the core value around which society and culture are constructed is military strength: sociality—and, hence, survival—rests on the organization, display, and/or actual deployment of military strength, and individuals are valued in proportion to the contributions they make to it. A social-signaling model also accounts for the gendering of culture: males and females are valued for, and in proportion to, the gender-inflected contributions they make to the military strength of the groups to which they belong. And the model provides a unifying theme for leadership in small-scale society: whether they be accumulators, aggrandizers, or achievers, managers, despots, or reciprocators (Clarke and Blake 1994; Hayden 1995), leaders are, in the ultimate analysis, those individuals who contribute most to the different manifestations of military strength mounted by the groups to which they belong.

With further research, a social-signaling model might ultimately be developed into a tool for *investigating* archeological sites in addition to interpreting them. Although New Guinean societies were alike in possessing a modular structure, a social-signaling system, and forms of leadership predicated on military strength, local manifestations of these features varied dramatically. Social structures varied from single subsistence-security groups among hunter-foragers, through village security structures made up several men's-houses or clans among fisher-foragers and lowland horticulturalists, to multiclan tribal security structures among highland agriculturalists. All three forms of conspicuous display—distribution, performance, and construction—were deployed throughout New Guinea, but performance reached its zenith in the central highlands, construction was most prominent in the lowlands, and material distribution more often took the form of feasting in the lowlands and pig-killing or pig-exchange in the central highlands. Leadership forms were also regionally differentiated. Courage and ability in warfare was a prerequisite for prestige and leadership almost everywhere, but along with hunting and ritual expertise, it was most prominent in low-density communities. In contrast, big-manship—the transaction of material goods—came to the fore in the central highlands and other regions of high population density. If a social-signaling model can be extended to account for these local permutations, if we can discern the demographic and material environments that generate one form rather than another, then ultimately we might use such a model not just to interpret what we find in an archeological site but to project from these remains the *particular* forms of social structure, ceremonial lives, and leadership that must have produced them.

Finally, to the extent that politically centralized societies remain small-scale societies writ large, a social signaling model provides some basis for comprehending the nature and organization of more complex societies. Alexander hypothesizes that balance-of-power races have been just as influential in the formation of modern states as of earlier forms of society, and the idea that conquest warfare was instrumental in the evolution of chiefdoms and states is of course widely recognized in archeology (see especially Carneiro 1970, 1981). It is worth giving more analytical attention, though, to the largely neglected hypothesis that chiefdoms, city-states, and states evolved not as instruments of *offensive*—or conquest—warfare but first and foremost as *defensive* organizations (a point that Service (1975, pp. 299, 300) adumbrated but failed to pursue in detail). As centralized polities develop, moreover, elements of small-scale social organization persist. Even in the modern state, social organization continues to assume a modular form, even as its structure becomes more complex and a multitude of different components emerge to take on novel roles: reproductive groups combine to create local economic, social, religious, political, and military institutions; local institutions combine as urban, county, or regional state institutions with politico-administrative functions; and urban, county, and regional states combine into federal or nation-state institutions.

The principal differences between centralized and uncentralized society lie in the realm of conflict management. As centralized organs are elaborated and usurp local control of physical violence, dependence on symbolic fighting as a means of managing conflict of interest declines and, along with it, codes of personal and political worth that emphasize individual and group strength. Even so, social signaling may persist in attenuated forms. Notwithstanding their ambitions to

monopolize the use of force, the centralized organs of a chiefdom or state may be too weak, or their frontier regions too far flung, to back up their monopolistic claims (e.g., Giddens 1985) and, to the extent this is the case, social signaling will continue to flourish. In the modern industrial state, for example, urban gangs and organized crime families, operating beyond the effective reach of judicial sanction, continue to exhibit a segmentary organization, to rule through intimidation and ritualized displays of strength, and to adhere to seemingly antiquated codes of “honor,” “respect,” and “deference.”

Beyond the borders of the chiefdom or state, social signaling also retains its force in regulating diplomatic relations. Even among nation-states, displays of military strength in the form of gun-boat diplomacy, military “exercises,” and May-day armament parades remain a crucial instrument for propagating dominance and preserving a precarious peace. And in the symbolic form of international sports, nations still aspire through competitive displays of strength and agility to pile up trophies that, trivial in their intrinsic value, nonetheless reap priceless returns in terms of national “glory,” “honor,” and “prestige.”

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References

- Adams, R. N. (1975). *Energy and structure: A theory of social power*. Austin, TX: University of Texas Press.
- Adler, M. A., & Wilshusen, R. H. (1990). Large-scale integrative facilities in tribal societies: Cross-cultural and southwestern US examples. *World Archaeology*, 22, 133–146.
- Alexander, R. D. (1974). The evolution of social behavior. *Annual Review of Ecology and Systematics*, 5, 325–383.
- Alexander, R. D. (1979). *Darwinism and human affairs*. Seattle: University of Washington Press.
- Alexander, R. D. (1987). *The biology of moral systems*. Hawthorn, NY: de Gruyter.
- Allen, B. J. (1976). *Information flow and innovation diffusion in the East Sepik District, Papua New Guinea*. Canberra: Ph.D. dissertation, Australian National University.
- AMB 3-68/69. (1968). *Ambunti patrol report No. 3, 1968/69*. Port Moresby, PNG: National Archives.
- Anderson, N. (1985). *Polopa Background Study*, unpublished manuscript. Ukarumpa, PNG: Summar Institute of Linguistics.
- Anderson, B. (1991). *Imagined communities: Reflections on the origin and spread of nationalism*. London: Verso.
- ANG 10-46/47. (1947). *Angoram patrol report No. 10, 1946/47*. Port Moresby, PNG: National Archives.
- Archer, J., & Huntingford, F. (1994). Game theory models and escalation of animal fights. In M. Potegal & J. F. Knutson (Eds.), *The dynamics of human aggression: Biological and social processes in dyads and groups*, pp. 3–31. Hillsdale, NJ: Lawrence Erlbaum.
- Arkush, E. N., & Allen, M. W. (ed.) (2006). *The Archaeology of War*. Gainesville, FL: University Press of Florida.
- Bandy, M. S. (2004). Fissioning, scalar stress, and social evolution in early village societies. *American Anthropologist*, 106, 322–333.
- Barnes, J. A. (1962). African models in the New Guinea highlands. *Man*, 62, 5–9.

- Bee, D. (1974). A Brief Note on Kinship and Social Groupings among the Usarufa. In D. R. Shaw (Ed.), *Kinship studies in Papua New Guinea*, pp. 125–135. Ukarumpa, PNG: Summer Institute of Linguistics.
- Bender, B. (1985). Emergent tribal formations in the American midcontinent. *American Antiquity*, 50, 52–62.
- Bergmann, W. (1971). *The Kamanuku (the culture of the Chimbu Tribes)*, 4 vols. Harrisville, Qld: W. Bergmann.
- Berndt, R. M. (1962). *Excess and restraint: Social control among a New Guinea mountain people*. Chicago: University of Chicago Press.
- Berndt, R. M. (1971). Political structure in the eastern central highlands of New Guinea. In R. M. Berndt & P. Lawrence (Eds.), *Politics in New Guinea: Traditional and in the context of change: Some anthropological perspectives*, pp. 381–423. Seattle: University of Washington Press.
- Bevan, T. F. (1890). *Toil, travel, and discovery in British New Guinea*. London: Kegan Paul, Trench, Trübner & Co.
- Bliege Bird, R., & Smith, E. A. (2005). Signaling theory, strategic interaction, and symbolic capital. *Current Anthropology*, 46, 221–238.
- Boelaars, J. (n.d. [1958]). *Papoea's aan de Mappi*. Utrecht-Antwerpen, De Fontein.
- Boelaars, J. H. M. C. (1981). *Head-hunters about themselves: An ethnographic report from Irian Jaya, Indonesia*. The Hague: Martinus Nijhoff.
- Boone, J. L. (1998). The evolution of magnanimity: When is it better to give than to receive? *Human Nature*, 9, 1–21.
- Boone, J. L. (2000). Social power, status, and lineage survival. In M. W. Diehl (Ed.), *Hierarchies in action: Cui Bono?*, pp. 84–110. Carbondale: Southern Illinois University Press.
- Boone, J. L., & Kessler, K. L. (1999). More status or more children? Social status, fertility reduction, and long-term fitness. *Evolution and Human Behavior*, 20, 257–277.
- Bowden, R. (1983). *Yena: Art and ceremony in a Sepik society*. Oxford: Pitt Rivers Museum.
- Bowers, N. (1968). *The Ascending Grasslands: An Anthropological Study of Ecological Succession in a High Mountain Valley of New Guinea*. New York: Ph.D. dissertation Columbia University.
- Boyd, D. J. (1975). *Crops, Kiaps, and currency: Flexible behavioral strategies among the Ilakia Awa of Papua New Guinea*. Los Angeles, Los Angeles: Ph.D. dissertation, University of California.
- Boyd, D. J., & Ito, K. L. (1988). Culture and context: Reproductive decision making in Okapa District, Eastern Highlands Province. In N. McDowell (Ed.), *Reproductive decision making and the value of children in rural Papua New Guinea, IASER Monographs, Vol. 27*, pp. 45–70. Boroko PNG: Papua New Guinea Institute of Applied Social and Economic Research.
- Boyd, R., & Richerson, P. J. (1988). The evolution of reciprocity in sizeable groups. *Journal of Theoretical Biology*, 132, 337–356.
- Boyd, R., & Richerson, P. J. (2002). Group beneficial norms spread rapidly in a structured population. *Journal of Theoretical Biology*, 215, 287–296.
- Bragge, L. E. (n.d.). *Unpublished interview notes*. Koetong, VA: Bragge Archives.
- Bragginton, J. R. (1975). *Patterns of interaction in the Beha Valley: A study of social organization in the eastern highlands of New Guinea*. Evanston, IL: Ph.D. dissertation, Northwestern University.
- Brandewie, E. B. (1981). *Contrast and context in New Guinea culture: The case of the Mbowamb of the central highlands*. St. Augustin: Anthropos-Institut.
- Braun, D. P., & Plog, S. (1982). Evolution of “tribal” social networks: Theory and prehistoric North American evidence. *American Antiquity*, 47, 504–525.
- Brookfield, H. C., & Brown, P. (1963). *Struggle for land: Agriculture and group territories among the Chimbu of the New Guinea highlands*. Melbourne: Oxford University Press.
- Brown, P. (1972). *The Chimbu: A study of change in the New Guinea highlands*. Cambridge: Schenkman, MA.
- Brown, D. J. J. (1979). The structuring of Polopa feasting and warfare. *Man (N.S.)*, 14, 712–733.
- Brown, P., & Brookfield, H. C. (1959). Chimbu land and society. *Oceania*, 30, 1–75.
- Brumbaugh, R. C. (1981). Economy, violence, and the ancestors. *Anthropology*, 5(2), 3–22.
- Bulmer, R. N. H. (1960). *Leadership and social structure among the Kyaka People of the Western Highlands District of New Guinea*. Canberra: Ph.D. thesis, Australian National University.
- Burton, J. (1988a). *Local group structures and territories: North Wahgi Census Division. Western Highlands Research Monograph (Gazetteer Series) No.1*. Port Moresby, PNG: University of Papua New Guinea, Department of Anthropology and Sociology.
- Burton, J. (1988b). *Local group structures and territories: South Wahgi Census Division. Western Highlands Research monograph (Gazetteer Series) No.2*. Port Moresby, PNG: University of Papua New Guinea, Department of Anthropology and Sociology.

- Burton, J. (1988c). *Local group structures and territories: Hagen Census Division. Western Highlands Research monograph (Gazetteer Series) No.3*. Port Moresby, PNG: University of Papua New Guinea, Department of Anthropology and Sociology.
- Carneiro, R. L. (1970). A theory of the origin of the state. *Science*, 169, 733–738.
- Carneiro, R. L. (1981). The chiefdom: Precursor of the state. In G. D. Jones & R. R. Kautz (Eds.), *The transition to statehood in the New World*, pp. 37–79. Cambridge, UK: Cambridge University Press.
- Clarke, W. C. (1971). *Place and people: An ecology of a New Guinean community*. Berkeley: University of California Press.
- Clarke, J. E., & Blake, M. (1994). The power of prestige: Competitive generosity and the emergence of rank in societies in lowland Mesoamerica. In E. M. Brumfiel & J. W. Fox (Eds.), *Factional competition and political development in the New World*, pp. 17–30. Cambridge: Cambridge University Press.
- Clutton-Brock, T. H., Albon, S. D., Gibson, R. M., & Guinness, F. E. (1979). The logical stag: Adaptive aspects of fighting in red deer (*Cervus alaphus* L.). *Animal Behavior*, 27, 211–225.
- Codere, H. (1950). *Fighting with property: A study of Kwakiutl Potlatching and warfare, 1792–1930*. New York: J.J. Augustin.
- Cook, E. A. (1967). *Manga Social Organization*. New Haven CT: Ph.D. dissertation, Yale University.
- Cook, E. A., & Pflanz-Cook, S. M. (1988). “Children Make Me Happy”: Reproductive Decision Making Among the Manga, Jimi District, Western Highlands Province. In N. McDowell (Ed.), *Reproductive decision making and the value of children in rural Papua New Guinea, IASER monographs*, Vol. 27, pp. 71–102. Boroko: Papua New Guinea Institute of Applied Social and Economic Research.
- Cranstone, B. A. L. (1968). War shields of the Telefomin Sub-district, New Guinea. *Man (N.S.)*, 3, 609–624.
- Curry, G. N. (1992). *Kin and Kina: A study of emerging inequalities in a rural lowland society in Papua New Guinea*. Ph.D. dissertation. Armidale, N.S.W.: University of New England.
- Dietler, M., & Hayden, B. (eds.) (2001). *Feasts: Archaeological and Ethnographic Perspectives on Food, Politics, and Power*. Washington, DC: Smithsonian Institution Press.
- Dunbar, R. I. M. (1989). Social systems as optimal strategy sets: The costs and benefits of sociality. In V. Standen & R. A. Foley (Eds.), *Comparative socioecology: The behavioural ecology of humans and other mammals (pp. 131–149)*. Blackwell Scientific: Oxford.
- DuToit, B. M. (1974). *Akuna: A New Guinea village community*. Rotterdam: A.A. Balkema.
- Dye, W., & Dye, S. (1967). *Gahom essentials for translation, part two: Anthropology*, unpublished manuscript. Ukarumpa, PNG: Summer Institute of Linguistics.
- Dye, T. W., & Dye Bakker, E. (1991). *The response of Bahinemo foragers to imposed land tenure changes: An Emic perspective*. Chicago: Paper presented at the Annual Meetings of the American Anthropological Association.
- Edmiston, P., & Edmiston, M. (1989). *Alamblak background study*, unpublished manuscript. Ukarumpa, PNG: Summer Institute of Linguistics.
- Enquist, M., & Leimar, O. (1990). The evolution off fatal fighting. *Animal Behavior*, 39, 1–9.
- Eyde, D. B. (1967). *Cultural correlates of warfare among the Asmat of South-west New Guinea*. New Haven: Ph.D. dissertation, Yale University.
- Feachem, R. (1974). The Raiapu Enga of the New Guinea highlands: Some ethnographic notes. *Asian & Pacific Quarterly of Cultural and Social Affairs*, 6(3), 9–24.
- Feinman, G. M., & Neitzel, J. (1984). Too many types: An overview of sedentary prestate societies in the Americas. In M. Schiffer (Ed.), *Advances in archaeological method and theory, vol. 7*, pp. 39–102. New York: Academic.
- Ferguson, R. B. (1997). Violence and war in prehistory. In D. L. Martin & D. W. Frayer (Eds.), *Troubled times: Violence and warfare in the past*, pp. 321–355. Amsterdam: Gordon and Breach.
- Ferguson, R. B. (2006). Archaeology, cultural anthropology, and the origins and intensifications of war. In E. N. Arkush & M. W. Allen (Eds.), *The archaeology of war: Prehistories of raiding and conquest*, pp. 469–523. Gainesville: University Press of Florida.
- Fischer, H. (1988). *Negwa: Eine Papua-gruppe im Wandel*. München: Klaus Renner.
- Forge, A. (n.d.). *Violence among the Abelam*, unpublished manuscript, File no. MSS 411, B19, F21, Mandeville Special Collections Library, University of California, San Diego.
- Forge, A. (1972). Normative factors in the settlement size of Neolithic cultivators (New Guinea). In P. J. Ucko, R. Tringham & G. W. Dimbleby (Eds.), *Man, settlement and urbanism*, pp. 363–376. London: Duckworth and Schenkman.
- Forge, A. (1990). The power of culture and the culture of power. In N. Lutkehaus, C. Kaufmann, W. E. Mitchell, D. Newton, L. Osmundsen & M. Schuster (Eds.), *Sepik heritage: Tradition and change in Papua New Guinea*, pp. 16–170. Durham, NC: Carolina Academic Press.

- Fortune, R. (n.d.). *Men of Purari*, unpublished manuscript. Fortune Archive, Turnbull Library, Wellington, NZ.
- Fountain, O. C. (1966). *Wulukum: Land, livelihood and change in a New Guinea Village*. Wellington: M. A. thesis, Victoria University of Wellington.
- Fry, D. P. (2006). *The human potential for peace: An anthropological challenge to assumptions about war and violence*. New York: Oxford University Press.
- Gardner, D. S. (1981). *Cult ritual and social organisation among the Mianmin*. Canberra: Ph.D. thesis, Australian National University.
- Gatewood, J. B. (2000). Distributional instability and the units of culture. *Ethnology*, 39, 293–303.
- Gell, A. (1975). *Metamorphosis of the Cassowaries: Umeda society, language and ritual*. London: Athlone.
- Giddens, A. (1985). *A contemporary critique of historical materialism, Vol. 2: Nation state and violence*. Berkeley, CA: University of California Press.
- Gintis, H., Smith, E. A., & Bowles, S. L. (2001). Cooperation and costly signaling. *Journal of Theoretical Biology*, 213, 103–119.
- Glasse, R. M. (1968). *Huli of Papua: A cognatic descent system*. Paris: Mouton & Co.
- Glasse, R. M., & Lindenbaum, S. (1973). South fore politics. In R. M. Berndt & P. Lawrence (Eds.), *Politics in New Guinea: Traditional and in the context of change: Some anthropological perspectives* (pp. 362–380). University of Washington Press: Seattle.
- Glick, L. B. (1963). *Foundations of a primitive medical system: The Gimi of the New Guinea Highlands*, Ph.D. dissertation. Philadelphia: University of Pennsylvania.
- Gombrich, E. H. (1982). *The Image and the Eye: Further Studies in the Psychology of Pictorial Representation*. Ithaca NY: Cornell University Press.
- Grafen, A. (1990). Biological signals as handicaps. *Journal of Theoretical Biology*, 144, 517–546.
- Green, I. (1986). Dou kinship terms. *Irian*, 14, 68–77.
- GR 1-52/53. (1952). *Green river patrol report no. 1, 1952/53*. Port Moresby, PNG: National Archives.
- Gudemi, P. V. (1992). *We came from this: Knowledge, memory, painting and "play" in the initiation rituals of the Sawiyano of Papua New Guinea*. Ann Arbor: Ph.D. dissertation, University of Michigan.
- Gurven, M., & Winking, J. (2008). Collective action in action: Prosocial behavior in and out of the laboratory. *American Anthropologist*, 110, 179–190.
- Haas, J. (1990). Warfare and the evolution of tribal polities in the prehistoric Southwest. In J. Haas (Ed.), *The anthropology of war*, pp. 171–189. Cambridge: Cambridge University Press.
- Hagen, E. H., & Bryant, G. A. (2003). Music and dance as a coalitional signaling system. *Human Nature*, 14, 21–51.
- Hamlin, N. (n.d.). *NAI Background Study*, unpublished manuscript. Ukarumpa, PNG: Summer Institute of Linguistics.
- Hamilton, W. D. (1964). The genetical evolution of social behavior. *Journal of Theoretical Biology*, 7, 1–52.
- Harrison, S. (1993). *The mask of war: Violence, ritual and the self in Melanesia*. Manchester: Manchester University Press.
- Harsanyi, J. C., & Selton, R. (1988). *A general theory of equilibrium selection in games*. Cambridge, MA: MIT.
- Hauser-Schäublin, B. (1989). *Kulthäuser in Nordneuguinea*. Abhandlungen und Berichte des Staatlichen Museums für Völkerkunde Dresden, Vol. 43. Akademie-Verlag, Berlin.
- Hawkes, K. (1993). Why hunter-gatherers work. *Current Anthropology*, 34(4), 341–362.
- Hawkes, K., & Bliege Bird, R. (2002). Showing off, handicap signaling, and the evolution of men's work. *Evolutionary Anthropology*, 11, 58–67.
- Hayano, D. M. (1972). *Marriage, alliance and warfare: The Tauna Awa of New Guinea*, Ph.D. dissertation. Los Angeles, Los Angeles: University of California.
- Hayden, B. (1995). Pathways to power: Principles for creating socioeconomic inequalities. In T. D. Price & G. M. Feinman (Eds.), *Foundations of social inequality*, pp. 105–127. New York: Plenum.
- Held, G. J. (1957). *The Papuas of Waropen*. The Hague: Martinus Nijhoff.
- Henrich, J. (2006). Cooperation, punishment, and the evolution of human institutions. *Science*, 312, 60–61.
- Henrich, J., & Boyd, R. (2001). Why people punish defectors: Weak conformist transmission can stabilize costly enforcement of norms in cooperative dilemmas. *Journal of Theoretical Biology*, 208, 79–89.
- Henrich, J., McElreath, R., Barr, A., Ensminger, J., Barrett, C., Bolyanatz, A., et al. (2006). Costly punishment across human societies. *Science*, 312, 1767–1770.
- Herdt, G. (1987). *The Sambia: Ritual and gender in New Guinea*. New York: Holt, Rinehart and Winston.
- Holmes, J. H. (1924). *In Primitive New Guinea: An account of a quarter of a century spent amongst the primitive Ipi & Namau groups of tribes of the Gulf of Papua, with an interesting description of their manner of living, their customs & habits, feasts & festivals, totems & cults*. New York: G.P. Putnam's Sons.
- Huber, P. B. (1974). *Identity and exchange: Kinship and social order among the Anggor of New Guinea*. Raleigh, NC: Ph.D. dissertation, Duke University.

- Huber, P. B. (1975). Defending the cosmos: Violence and social order among the Anggor of New Guinea. In M. A. Nettleship, R. Dalegivens & A. Nettleship (Eds.), *War, its causes and correlates*, pp. 619–661. The Hague: Mouton.
- Jakobsson, S., Radesäter, T., & Järvi, T. (1979). On the Fighting behaviour of Nannacara Anomala (Pisces, Cichlidae) males. *Zeitschrift für Tierpsychologie*, 49, 210–220.
- Johannes, A. (1976). *Illness and medical care in a New Guinea Highlands Society*. Evanston, IL: Ph.D. dissertation, Northwestern University.
- Johnson, G. (1978). Information sources and the development of decision-making organizations. In C. L. Redman (Ed.), *Social archaeology: Beyond subsistence and dating*, pp. 87–112. New York: Academic.
- Johnson, G. (1982a). Organizational structure and scalar stress. In C. Renfrew, M. Rowlands & B. A. Segraves (Eds.), *Theory and explanation in archaeology*, pp. 389–421. New York: Academic.
- Johnson, P. L. (1982). *Gainj Kinship and Social Organization*. Ann Arbor MI: Ph.D. dissertation, University of Michigan.
- Johnson, A. W., & Earle, T. K. (1987). *The evolution of human societies: From foraging group to agrarian state*. Stanford, CA: Stanford University Press.
- Johnstone, R. A. (1997). The evolution of animal signals. In J. R. Krebs & N. B. Davies (Eds.), *Behavioural ecology: An evolutionary approach*, pp. 155–178. Oxford: Blackwell.
- Juillerat, B. (1996). *Children of the blood: Society, reproduction and cosmology in New Guinea*. Berg, Oxford: Nora Scott (Transl.).
- Kaberry, P. M. (1941/42). Law and political organization in the Abelam Tribe, New Guinea. *Oceania*, 12, 79–95, 209–225, 331–363.
- Kaberry, P. M. (1971). Political organization among the Northern Abelam. In R. M. Berndt & P. Lawrence (Eds.), *Politics in New Guinea: Traditional and in the context of change: Some anthropological perspectives*, pp. 35–73. Nedlands: University of Western Australia Press and University of Washington Press.
- Keeley, L. H. (1996). *War before civilization: The myth of the peaceful savage*. New York: Oxford University Press.
- Keeley, L. H. (2001). Giving war a chance. In G. E. Rice & S. A. LeBlanc (Eds.), *Deadly landscapes: Case studies in prehistoric warfare*, pp. 331–342. Salt Lake City: University of Utah Press.
- Kelly, R. C. (1977). *Etoro social structure: A study in structural contradiction*. Ann Arbor: University of Michigan Press.
- Kelly, R. L. (1995). *The foraging spectrum: Diversity in hunter-gatherer lifeways*. Washington: Smithsonian Institution.
- Kelly, R. C. (2000). *Warless societies and the origin of war*. Ann Arbor: University of Michigan Press.
- Kim, Y. H. (1997). Edopi kinship, marriage, and social structure. In M. Gregerson & J. Sterner (Eds.), *Kinship and social organization in Irian Jaya: A glimpse of seven systems*, pp. 199–220. Jayapura and Dallas: Cenderawasih University and Summer Institute of Linguistics.
- Knauff, B. M. (1985). *Good company and violence: Sorcery and social action in a lowland New Guinea society*. Berkeley: University of California Press.
- Koch, K.-F. (1974). *War and Peace in Jalémó: The management of conflict in highland New Guinea*. Cambridge, MA: Harvard University Press.
- Kosse, K. (1990). Group size and societal complexity: Thresholds in the long-term memory. *Journal of Anthropological Archaeology*, 9, 275–303.
- Kosse, K. (1994). The evolution of large, complex groups: A hypothesis. *Journal of Anthropological Archaeology*, 13, 35–50.
- Krebs, J. R., & Davies, N. B. (1993). *An introduction to behavioural ecology*. Oxford: Blackwell Scientific.
- KTU 10-54/55. (1955). *Kainantu Patrol Report No.10, 1954/55*. National Archives, Port Moresby, PNG.
- Landtman, G. (1927). *The Kiwai Papuans of British New Guinea: A nature-born instance of Rousseau's ideal community*. London: Macmillan.
- Langness, L. L. (1964a). Some problems in the conceptualization of highlands social structures. In J. B. Watson (Ed.), *New Guinea: The central highlands*, pp. 162–182. Menasha, WI: American Anthropological Association.
- Langness, L. L. (1964b). *Bena Bena Social Structure*. Seattle: Ph.D. dissertation, University of Washington.
- Langness, L. L. (1969). Marriage in Bena Bena. In R. M. Glasse & M. J. Meggitt (Eds.), *Pigs, pearlshells, and women: Marriage in the New Guinea highlands*, pp. 38–55. Englewood Cliffs, NJ: Prentice-Hall.
- Langness, L. L. (1971). Bena Bena political organization. In R. M. Berndt & P. Lawrence (Eds.), *Politics in New Guinea: Traditional and in the context of change: Some anthropological perspectives*, pp. 298–316. Nedlands: University of Western Australia Press and University of Washington Press.

- Laszlo, M. (n.d.). *Sepik Iwam Anthropology (Hauna Village)*, unpublished manuscript. Ukurumpa, PNG: Summer Institute of Linguistics.
- Lea, D. A. M. (1964). *Abelam land and sustenance*. Canberra: Ph.D. thesis, Australian National University.
- LeBlanc, S. A. (1999). *Prehistoric warfare in the American Southwest*. Salt Lake City: University of Utah Press.
- LeBlanc, S. A. (2003). *Constant battles: The myth of the peaceful, noble savage*. New York: St Martin's.
- Lee, R. B., & Devore, I. (1968). Problems in the study of hunters and gatherers. In R. B. Lee & I. Devore (Eds.), *Man the hunter*, pp. 3–12. Chicago: Aldine.
- Leininger, M. M. (1966). *Convergence and divergence of human behavior: An ethnopsychological comparative study of two Gadsup Villages in the Eastern Highlands of New Guinea*. Seattle: Ph.D. dissertation, University of Washington.
- Lepervanche, M. de. (1967). Descent, residence and leadership in the New Guinea highlands. *Oceania*, 38, 134–158, 163–189.
- Levine, H. G. (1977). *Intracultural variability and ethnographic description: A decision-making analysis of funerary behavior among the New Guinea Kafe*, Ph.D. dissertation. Philadelphia: University of Pennsylvania.
- Lewis, G. (1975). *Knowledge of illness in a Sepik society*. London: Athlone.
- Lewis, G. (1980). *Day of shining red: An essay on understanding ritual*. Cambridge: Cambridge University Press.
- Lewis, G. (1995). Payback and ritual in war: New Guinea. In R. A. Hinde & H. E. Watson (Eds.), *War: A cruel necessity? The bases of institutionalized violence*, pp. 24–36. London: I.B. Tauris.
- MacDonald, M. N. (1991). *Mararoko: A study in Melanesian religion*. New York: Peter Lang.
- Mayer, J. R. (1987). *Sickness, healing and gender in Ommura, Central Highlands, Papua New Guinea*. Sussex: Ph.D. dissertation, University of Sussex.
- Maynard Smith, J., & Price, G. R. (1973). The logic of animal conflict. *Nature, London*, 246, 15–18.
- McDowell, N. (1988). Reproductive decision making and the value of children in Bun, East Sepik Province. In N. McDowell (Ed.), *Reproductive decision making and the value of children in rural Papua New Guinea, IASER monographs, Vol. 27*, pp. 125–135. Boroko PNG: Papua New Guinea Institute of Applied Social and Economic Research.
- Mead, M. (1935). *Sex and temperament in three primitive societies*. New York: W. Morrow.
- Meggitt, M. J. (1965). *The lineage system of the Mae-Enga of New Guinea*. Edinburgh: Oliver & Boyd.
- Meggitt, M. J. (1971). The pattern of leadership among the Mae-Enga of New Guinea. In R. M. Berndt & P. Lawrence (Eds.), *Politics in New Guinea: Traditional and in the context of change: Some anthropological perspectives (pp. 191–206)*. University of Washington Press: Seattle.
- Meggitt, M. J. (1977). *Blood is their argument: Warfare among the Mae Enga tribesmen of the New Guinea highlands*. Palo Alto, CA: Mayfield.
- Mettgoff, S. K. (1985). Social and cultural factors which influence aggression. Part II: "Lethal dance" and the social structure of war. In J. M. Ramirez & P. F. Brain (Eds.), *Aggression: Functions and causes*, pp. 67–83. Seville: Publicaciones de la Universidad de Sevilla.
- Modjeska, C. J. N. (1977). *Production among the Duna: Aspects of Horticultural Intensification in Central New Guinea*. Canberra: Ph.D. dissertation, Australian National University.
- Morren, G. E. B. Jr. (1974). *Settlement strategies and hunting in a New Guinea society*. New York: Ph.D. dissertation, Columbia University.
- Murdock, G. P. (1949). *Social structure*. New York: Macmillan.
- Neiman, F. D. (1998). Conspicuous consumption as wasteful advertising: A Darwinian perspective on spatial patterns in classic Maya terminal monument dates. In C. M. Barton & G. A. Clark (Eds.), *Rediscovering Darwin: Evolutionary theory in archaeological explanation*, pp. 267–290. Arlington, VA: American Anthropological Association.
- Newman, P. L. (1962). *Supernaturalism and Ritual among the Gururumba*. Seattle: Ph.D. dissertation, University of Washington.
- Newman, P. L. (1965). *Knowing the Gururumba*. New York: Holt, Rinehart and Winston.
- Newman, P. L. (1972). *Irahqkiah of New Guinea*. New Haven, CT: Human Relations Area Files.
- O'Hanlon, M. (1989). *Reading the skin: Adornment, display and society among the Wahgi*. London: British Museum.
- Oosterwal, G. (1961). *People of the Tor: A cultural-anthropological study on the tribes of the Tor territory (Northern Netherlands New-Guinea)*. Assen: Royal van Gorcum.
- Oosterwal, G. (1963). *Die Papua: Von der Kultur eines Naturvolkes*. Stuttgart: Kohlhammer.
- Oosterwal, G. (1967). Muremarew: A dual organized village on the Mamberamo, West Irian. In Koentjaraningrat (ed.), *Villages in Indonesia (pp. 157–188)*. Ithaca, NY: Cornell University Press.
- Panchanathan, K., & Boyd, R. (2004). Indirect reciprocity can stabilize cooperation without the second-order free rider problem. *Nature*, 432, 499–502.

- Parker, G. A. (1974). Assessment strategy and the evolution of fighting behaviour. *Journal of Theoretical Biology*, 47, 223–243.
- Paulsen, R. (1992). *Symbolic dimensions in the analysis of social organization: A case study of food taboos among the May River Iwam, Papua New Guinea*. Oslo: Ph.D. dissertation, University of Oslo.
- Philsooph, H. A. (1980). *A study of a West Sepik people, New Guinea, with special reference to their system of beliefs, kinship and marriage, and principles of thought*, Ph.D. dissertation. Edinburgh: University of Edinburgh.
- Ploeg, A. (1969). *Government in Wanggulam*. The Hague: Martinus Nijhoff.
- Plog, S., & Braun, D. P. (1984). Some issues in the archaeology of “tribal” social systems. *American Antiquity*, 49, 619–625.
- Pospisl, L. (1958). *Kapauku Papuans and their law*. New Haven, CT: Yale University, Department of Anthropology.
- Pospisl, L. (1963). *Kapauku Papuan economy*. New Haven, CT: Yale University, Department of Anthropology.
- Potter, J. (2000). Pots, parties, and politics: Communal feasting in the American southwest. *American Antiquity*, 65, 471–492.
- Pouwer, J. (n.d.). *Enkele Aspecten van de Mimika-cultuur (Nederlands Zuidwest Nieuw Guinea): Proefschrift*. 's-Gravenhage: Staatsdrukkerij-en Uitgeversbedriek.
- Price, T. D., & Brown, J. A. (1985). Aspects of hunter-gatherer complexity. In T. D. Price & J. A. Brown (Eds.), *Prehistoric hunter-gatherers: The emergence of cultural complexity*, pp. 3–20. Orlando, FL: Academic.
- Rappaport, R. A. (1968). *Pigs for the ancestors: Ritual in the ecology of a New Guinea people*. New Haven, CT: Yale University Press.
- Read, K. E. (1951). The Gahuku-Gama of the central highlands. *South Pacific*, 5, 154–164.
- Read, K. E. (1955). Morality and the concept of the person among the Gahuku-Gama. *Oceania*, 25, 233–282.
- Read, K. E. (1959). Leadership and consensus in a New Guinea society. *American Anthropologist*, 61, 425–436.
- Read, K. E. (1965). *The high valley*. New York: Charles Scribner's Sons.
- Read, K. E. (1971). Nama cult of the central highlands, New Guinea. In L. L. Langness & J. C. Weschler (Eds.), *Melanesia: Readings on a culture area*, pp. 214–239. Scranton, PA: Chandler.
- Reay, M. (1959). *The Kuma: Freedom and conformity in the New Guinea highlands*. Carlton, Victoria: Melbourne University Press on behalf of the Australian National University.
- Reay, M. (1984). Pre-colonial status and prestige in the Papua New Guinea highlands. In R. J. May (ed.), *Social Stratification in Papua New Guinea* (pp. 29–52). Canberra: Australian National University, Research School of Pacific Studies, Department of Political and Social Change.
- Reay, M. (1987). The Magico-religious foundations of New Guinea Highlands warfare. In: M. Stephen (Ed.), *Sorcerer and Witch in Melanesia*, pp.83–120. New Brunswick, NJ: Rutgers University Press.
- Rehburg, J. (1974). Social structure of the Sepik Iwam. In R. D. Shaw (Ed.), *Kinship studies in Papua New Guinea*, pp. 211–222. Ukarumpa, PNG: Summer Institute of Linguistics.
- Riebe, I. (1974). “... And then we killed”: *An Attempt to understand the fighting history of Upper Kaironk Valley Kalam from 1914–1962*. Sydney: B.A. thesis, University of Sydney.
- Robbins, S. (1982). *Auyana: Those who held onto home*. Seattle: University of Washington Press.
- Roscoe, P. B. (n.d.a). *Fieldnotes*, Files of the author, Orono, ME.
- Roscoe, P. B. (n.d.b). Symbolic violence and ceremonial peace. In Dickhardt, M., Hermann, E., and Klenke, K. (eds.), *Form, Macht, Differenz: Festschrift für Brigitta Hauser-Schäublin*, Universitätsverlag Göttingen, Göttingen. In press.
- Roscoe, P. B. (1989). The pig and the long yam: The expansion of a Sepik cultural complex. *Ethnology*, 28, 219–231.
- Roscoe, P. B. (1995a). Of power and menace: Sepik art as an affecting presence. *Journal of the Royal Anthropological Institute*, 1, 1–22.
- Roscoe, P. B. (1995b). In the shadow of the Tambaran: Female initiation among the Ndu of the Sepik Basin. In N. C. Lutkehaus & P. B. Roscoe (Eds.), *Gender rituals: Female initiation in Melanesia*, pp. 55–82. New York: Routledge.
- Roscoe, P. B. (1996). War and society in Sepik New Guinea. *Journal of the Royal Anthropological Institute*, 2, 645–666.
- Roscoe, P. B. (2000). New Guinea leadership as ethnographic analogy: A critical review. *Journal of Archaeological Method and Theory*, 7, 79–126.
- Roscoe, P. B. (2001). “Strength” and sexuality: Sexual avoidance and masculinity in New Guinea and Amazonia. In T. Gregor & D. Tuzin (Eds.), *Gender in Amazonia and Melanesia: An exploration of the comparative method*, pp. 279–308. Berkeley: University of California Press.
- Roscoe, P. B. (2002). The hunters and gatherers of New Guinea. *Current Anthropology*, 43, 153–162.

- Roscoe, P. B. (2003). Margaret Mead, Reo Fortune, and Mountain Arapesh warfare. *American Anthropologist*, 105, 581–591.
- Roscoe, P. B. (2005). Foraging, ethnographic analogy, and Papuan pasts. In A. Pawley, R. Attenborough, J. Golson, & R. Hide (eds.), *Papuan pasts: Cultural, linguistic, and biological histories of Papuan-speaking peoples. Pacific Linguistics, Vol. 572* (pp. 555–584). Canberra: Research School of Pacific and Asian Studies, The Australian National University.
- Roscoe, P. B. (2006). Fish, game, and the foundations of complexity in forager society: The evidence from New Guinea. *Cross-Cultural Research: The Journal of Comparative Social Science*, 40, 29–46.
- Roscoe, P. B. (2007). Intelligence, coalitional killing, and the antecedents of war. *American Anthropologist*, 109, 485–495.
- Roscoe, P. B. (2008a). The comparative method. *Religion Compass*, 2(4), 734–753.
- Roscoe, P. B. (2008b). Settlement fortification in village and ‘tribal’ society: Evidence from contact-era New Guinea. *Journal of Anthropological Archaeology*, 27, 507–519.
- Roscoe, P., & Wais Roscoe, B. (1988). Reproductive decision making and the value of children: The Yangoru Boiken of the Yangoru Subdistrict, East Sepik Province. In M. McDowell (Ed.), *Reproductive decision making and the value of children in rural Papua New Guinea, IASER monographs, Vol. 27*, pp. 103–123. Boroko, PNG: Papua New Guinea Institute of Applied Social and Economic Research.
- Ross, W. A. (1937). Mogeï’s big barbecue. *The Christian Family and Our Missions*, 32(84–85), 98.
- Ryan, D’A. (1961). *Gift exchange in the Mendi Valley: An examination of the socio-political implications of the ceremonial exchange of wealth among the people of the Mendi Valley, Southern Highlands District, Papua*. Sydney: Ph.D. dissertation, University of Sydney.
- Sahlins, M. D. (1961). The segmentary lineage: An organization of predatory expansion. *American Anthropologist*, 63, 322–345.
- Sahlins, M. D. (1963). Poor man, rich man, big-man, chief: Political types in Melanesia and Polynesia. *Comparative Studies in Society and History*, 5, 285–303.
- Sahlins, M. D. (1968). *Tribesmen*. Englewood Cliffs, NJ: Prentice-Hall.
- Salisbury, R. F. (1962). *From stone to steel: Economic consequences of a technological change in New Guinea*. Victoria: Melbourne University Press.
- Scaglion, R. B. (1976). *Seasonal patterns in Western Abelam conflict management practices: The ethnography of law in the Maprik Sub-province, East Sepik Province, Papua New Guinea*. Pittsburgh: Ph.D. dissertation, University of Pittsburgh.
- Schieffelin, E. L. (1991). The Great Papuan Plateau. In E. L. Schieffelin & R. Crittenden (Eds.), *Like people you see in a dream: First contact in six Papuan societies*, pp. 58–87. Stanford: Stanford University Press.
- Service, E. R. (1971). *Primitive social organization* (2nd ed.). New York: Random House.
- Service, E. R. (1975). *Origins of the state and civilization*. New York: Norton.
- Smith, E. A. (1981a). The application of optimal foraging theory to the analysis of hunter-gatherer group size. In B. Winterhalder & E. A. Smith (Eds.), *Hunter-gatherer foraging strategies: Ethnographic and archaeological analyses*, pp. 36–65. Chicago: University of Chicago Press.
- Smith, R. M. (1981b). *Conversion and continuity: Response to missionization in the Papua New Guinea highlands*. Canberra: Ph.D. dissertation, Australian National University.
- Smith, E. A. (1987). Optimization theory in anthropology: Applications and critiques. In J. Dupré (Ed.), *The latest on the best: Essays on evolution and optimality*, pp. 201–249. Cambridge, MA: Bradford Books/MIT.
- Smith, E. A., & Blice Bird, R. (2005). Costly signaling and cooperative behavior. In H. Gintis, S. Bowles, R. Boyd & E. Fehr (Eds.), *Moral sentiments and material interests: The foundations of cooperation in economic life*, pp. 115–148. Cambridge, MA: MIT.
- Stanek, M. (1983). *Sozialordnung und Mythik in Palimbei: Bausteine zur ganzheitlichen Beschreibung einer Dorfgemeinschaft der Iatmul East Sepik Province, Papua New Guinea*. Basel: Ethnologisches Seminar der Universität und Museum für Völkerkunde.
- Steadman, L. B. (1971). *Neighbours and killers: Residence and dominance among the Hewa of New Guinea*. Canberra: Ph.D. dissertation, Australian National University.
- Strathern, A. (1971). *The rope of Moka: Big-men and ceremonial exchange in Mount Hagen New Guinea*. Cambridge: Cambridge University Press.
- Strathern, A. (1972a). *One father, one blood: Descent and group structure among the Melpa people*. London: Tavistock.
- Strathern, M. (1972b). *Women in between: Female roles in a male world: Mount Hagen, New Guinea*. London: Seminar.
- Strathern, M. (1985). Discovering “social control”. *Journal of Law and Society*, 12, 111–134.

- Strauss, H., & Tischner, H. (1990 [1962]). In B. Shields, G. Stürzenhofecker, & A. J. Strathern, (transl. and eds.), *The Mi-culture of the Mount Hagen People, Papua New Guinea, Ethnology monographs, Vol. 13*. Pittsburgh: University of Pittsburgh.
- Telban, B. (1998). *Dancing through time: A Sepik cosmology*. Oxford: Clarendon.
- Townsend, P. K. W. (1969). *Subsistence and social organization in a New Guinea Society*. Ann Arbor MI: Ph.D. dissertation, University of Michigan.
- Townsend, P. K. (1978). The politics of mobility among the Sanio-Hiowe. *Anthropological Quarterly*, 51, 27–35.
- Trigger, B. (1990). Monumental architecture: A thermodynamic explanation of symbolic behavior. *World Archaeology*, 22, 119–132.
- Trivers, R. L. (1971). The evolution of reciprocal altruism. *Quarterly Review of Biology*, 46, 35–57.
- Tuzin, D. F. (1976). *The Iahita Arapesh: Dimensions of unity*. Berkeley: University of California Press.
- Tuzin, D. F. (1980). *The voice of the Tambaran: Truth and illusion in Iahita Arapesh religion*. Berkeley: University of California Press.
- Tuzin, D. F. (1984). Miraculous voices: The auditory experience of numinous objects. *Current Anthropology*, 25, 579–589.
- van der Kroef, J. M. (1952). Some head-hunting traditions of southern New Guinea. *American Anthropologist*, 54, 221–235.
- van der Leeden, A. C. (1962). The arrows of Sarmi. In Members of the Academic Staff of the National Museum of Ethnology (ed.), *The wonder of man's ingenuity, being a series of studies in archaeology, material culture, and social anthropology* (pp. 81–101). Leiden: E.J. Brill.
- Vayda, A. P. (1989). Explaining why Marings fought. *Journal of Anthropological Research*, 45, 159–177.
- Vicedom, G. F., & Tischner, H. (n.d.) *The Mbowamb: The culture of the Mount Hagen Tribes in East Central New Guinea, Vol. 2. I. Social organisation. II. Religion and cosmology*. F.E. Rheinstein and E. Klestadt (Transl.). Canberra: unpublished manuscript, Menzies Library, Australian National University.
- Waddell, E. (1972). *The mound builders: Agricultural practices, environment, and society in the central highlands of New Guinea*. Seattle: University of Washington Press.
- Walstab, J. (1924). [Progress Report on Sepik River Expedition to Government Secretary, 24th April 1924.] Unpublished manuscript, New Guinea—Inter-tribal Fighting, No. CRS A518, Item K840/1/3. Australian Archives, Canberra.
- Warry, W. (1987). *Chuave politics: Changing patterns of leadership in the Papua New Guinea highlands*. Canberra: Australian National University, Research School of Pacific Studies, Department of Political and Social Change.
- Wassmann, J. (1991). *The song to the flying fox: The public and esoteric knowledge of the important men of Kandingei about totemic songs, names and knotted cords (Middle Sepik, Papua New Guinea)*. Stephenson, Dennis Q. (Transl.) National Research Institute, Boroko, PNG.
- Watson, J. B. (1970). Tyrannical power in a small society: The case of a New Guinea strong man. *VII-me Congres International des Sciences Anthropologiques et Ethnologiques*, 9, 7–12.
- Watson, J. B. (1971). Tairora: The politics of despotism in a small society. In R. M. Berndt & P. Lawrence (Eds.), *Politics in New Guinea: Traditional and in the context of change: Some anthropological perspectives*, pp. 224–275. Seattle: University of Washington Press.
- Watson, J. B. (1983). *Tairora culture: Contingency and pragmatism*. Seattle: University of Washington Press.
- Webster, D. (1975). Warfare and the evolution of the state: A reconsideration. *American Antiquity*, 40, 464–470.
- Whiting, J. W. M. (1941). *Becoming a Kwoma: Teaching and learning in a New Guinea tribe*. New Haven, CT: Yale University Press.
- Williams, F. E. (1924). *The natives of the Purari Delta*. Port Moresby, PNG: Government Printer.
- Winterhalder, B. (1986). Diet choice, risk and food sharing in a stochastic environment. *Journal of Anthropological Archaeology*, 5, 369–392.
- Winterhalder, B., & Smith, E. A. (2000). Analyzing adaptive strategies: Human behavioral ecology at twenty-five. *Evolutionary Anthropology*, 9, 51–72.
- Wrangham, R. W. (1999). Evolution of coalitionary killing. *Yearbook of Physical Anthropology*, 42, 1–30.
- Young, M. W. (1971). *Fighting with food*. Cambridge: Cambridge University Press.
- Young, H. P. (1998). *Individual strategy and social structure: An evolutionary theory of institutions*. Princeton, NJ: Princeton University Press.
- Zahavi, A. (1975). Mate selection—A selection for handicap. *Journal of Theoretical Biology*, 53, 205–214.
- Zahavi, A., & Zahavi, A. (1997). *The Handicap Principle: A Missing Piece of Darwin's Puzzle*. New York: Oxford University Press.
- Zuckerman, S. (1984). *Incorporating the world system: Culture and historical transformation among the Kamano of Papua New Guinea*. Chicago: Ph.D. dissertation, University of Chicago.