

Group Structure and Female Cooperative Networks in Australia's Western Desert

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Published online: 17 July 2008
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Abstract The division of labor has typically been portrayed as a complementary strategy in which men and women work on separate tasks to achieve a common goal of provisioning the family. In this paper, we propose that task specialization between female kin might also play an important role in women's social and economic strategies. We use historic group composition data from a population of Western Desert Martu Aborigines to show how women maintained access to same-sex kin over the lifespan. Our results show that adult women had more same-sex kin and more closely related kin present than adult men, and they retained these links after marriage. Maternal co-residence was more prevalent for married women than for married men, and there is evidence that mothers may be strategizing to live with daughters at critical intervals—early in their reproductive careers and when they do not have other close female kin in the group. The maintenance of female kin networks across the lifespan allows for the possibility of cooperative breeding as well as an all-female division of labor.

Keywords Martu Aborigines · Division of labor · Group composition · Cooperation · Australia

Among hunter-gatherers, cooperative kin networks have long been thought to be at the nexus of most social structures and interpersonal behaviors. The combination of close proximity and a high coefficient of relatedness makes relatives ideal partners and kin cooperation one of the few true human universals. One critically important form of cooperative behavior is the division of labor, or task specialization. Typically, research on task specialization has been portrayed within the confines of the sexual division of

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labor. The husband is seen as an essential partner, either to provide nutrients not found in women's gathered food or to supplement the wife's provisioning when she is encumbered with child care (Hurtado et al. 1985; Marlowe 2003). In this paper we will look at the potential for task specialization not between husband and wife, but among women, particularly between close female kin, through an analysis of residential group data for a historic population of Martu Aborigines living in Australia's Western Desert (Fig. 1).

The origins of the traditional emphasis on complementarity in the sexual division of labor stem mainly from assertions about limitations on women's productive capacity owing to the competing demands of pregnancy, lactation, and child care. In a short but pivotal essay, Brown (1970) suggested that the degree to which women contribute to subsistence is based primarily on the compatibility of women's work with child care. She predicted that women's work should be focused on low-risk activities close to home, which did not require her undivided attention and could easily be interrupted and resumed. Modifications of this hypothesis have stressed gender differences in strength (Murdock and Provost 1973) and the avoidance of danger and long-distance travel (White et al. 1977). That women curtail or adjust their subsistence activities owing to child-care constraints has been adequately shown in several societies (Hames 1988; Hurtado et al. 1985; Jarvenpa and Brumbach 1995; Kramer 2004), but recent literature has emphasized the range of strategies that women can pursue to manage the dual tasks of production and reproduction, rather than focusing on limitations to either their physical prowess or the range and difficulty of their tasks (Kramer 2005; Peacock 1991).

An alternate view of the division of labor emphasizes the differing strategies of men and women and proposes that conflict rather than cooperation might be driving foraging decisions (Bird 1999). If husbands and wives experience conflicting goals that tend to

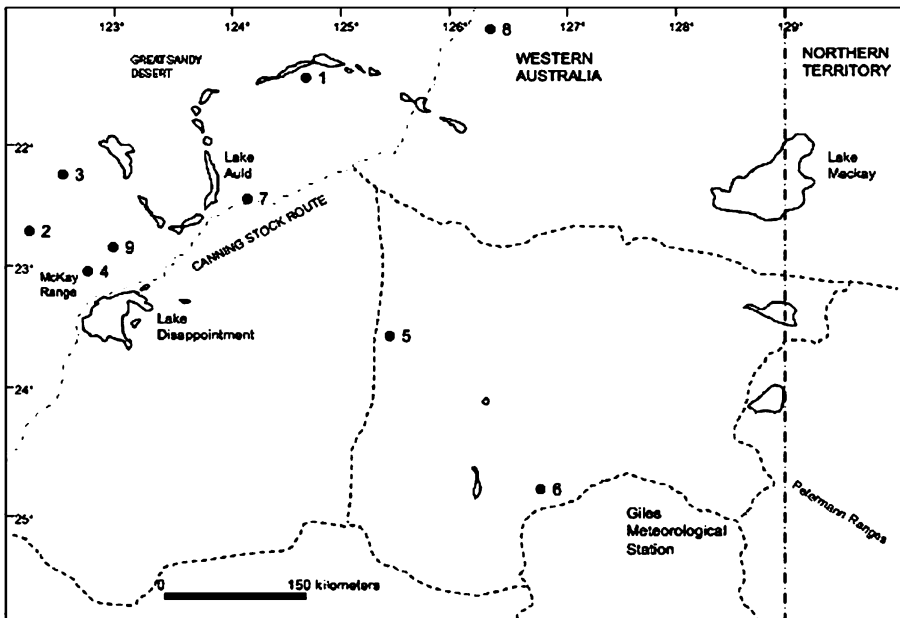


Fig. 1 Map of Western Desert groups (adapted from Peterson and Long 1986)

create divergent economic strategies, cooperative offspring provisioning could become more important among female kin than among marital pairs. This new emphasis on female cooperative kin networks, especially within the realm of subsistence and child care, supports Hrdy's (2005) hypothesis that human females are facultatively cooperative breeders. Hrdy proposes that cooperative breeding was the key strategy that allowed our ancestors to produce big-brained, highly dependent children in relatively short intervals. Although helpful husbands are not excluded from the human cooperative-breeding model, the emphasis has been more broadly set to include a wide range of helpers, notably including female kin.

The sexual division of labor incorporates notions of specialization according to productive efficiency, with tasks assigned to one or the other gender based on comparative advantage. Specialization in within-sex cooperation may function similarly, but through intergenerational partnerships, whereby production is skewed to those who are not in their prime reproductive years. In this scenario, an individual specializes in less-productive economic activities during the period when her energy is being diverted to pregnancy and child care, producing more before and after (rather than during) the active years of her reproductive career. Hawkes and colleagues have emphasized this type of partnership in their work among the Hadza, where they show that postmenopausal females are hard-working foragers who can readily supplement the calories being brought in by their less-productive, younger female kin (Hawkes 2003; Hawkes et al. 1997, 1998, 2000). Intergenerational partnerships can also be formed around caretaking. Child caretakers, particularly pre-reproductive elder daughters, are common in many societies (Berezkei and Dunbar 2002; Bove et al. 2002; Kramer 2005; Levine and Levine 1988; Turke 1988) but may be more important in agricultural economies than among foragers (Hames and Draper 2004). Partnerships between elder women ("grandmothers") and their reproductively active daughters and nieces are also common in a wide variety of social and economic contexts, and help from these elder women has been linked to improved child health outcomes (Hawkes et al. 1997; Ragsdale 2004; Sear et al. 2000; Sear et al. 2002) and improved reproductive success for daughters (Leonetti et al. 2005). Grandmothers have also been mentioned as important teachers, taking their granddaughters out foraging with them (Jarvenpa and Brumbach 1995) and again diverting foraging effort to both ends of the lifespan.

Women in the same age category, such as sisters or co-wives in polygynous marriages, could also cooperate via short-term reciprocal networks in which women take turns foraging and caring for children. Co-wife cooperation is mentioned frequently in cultures where women hunt (Estioko-Griffin and Griffin 1981; Romanoff 1983). Even among the !Kung, where allomaternal care is less common than in other foraging societies, Draper (1975) states that young unmarried women are more likely to forage singly, whereas married women with young children tend to work in groups. Presumably, allowing children to play in groups diverts their attention from their mothers, increasing the mothers' work efficiency.

Female Cooperation among Australian Hunter-Gatherers

... in the life of an aboriginal woman, no one is more important than her mother when she is young, her daughters when she is old. The mother-daughter tie

persists through life and functions as the organizing principle for a mutually supportive social group composed of matrilineally related females (Hamilton 1970:20).

Aboriginal women feature prominently as food producers in most early ethnographic accounts that mention women's productivity. Early narratives penned by explorers, government officials, and a few nascent anthropologists describe a subsistence dominated by women's production—not only of plant foods such as tree and grass seeds but also of small animals, particularly burrowing marsupials and lizards (Finlayson 1935; Gould 1969; B. Hiatt 1970; Long 1971). Women's foraging in this context requires a high degree of skill and strength and is not easily compatible with child care (Bliege Bird and Bird 2008).

Aboriginal women may have historically been able to pursue these types of activities, despite the constraints they imposed, by utilizing cooperative networks, either with co-wives or between kin of different generations, particularly mothers and daughters. Episodes of female cooperation are commonly mentioned in the Australian literature, although details of how these networks functioned are often vague. In 1939, Kaberry, discussing the situation in the Kimberleys, found that co-wives were generally "on excellent terms," and that women welcomed the additional help that came with a polygynous union (2003:154). Meggitt's description of polygyny among the Walbiri of the Northern Territory emphasized the intergenerational transfers that occurred between co-wives, who often differed significantly in age (1962:112). The elder co-wife was expected to help train the younger in matters of child care, foraging, food preparation, and relations with the opposite sex, while the younger co-wife took over many of the more tedious domestic jobs, such as collecting firewood and water. Devitt (1988) noted that when Central Desert women hunted they usually did so without children present, implying the presence of other caretakers in camp. She also emphasized the economic partnerships between older and younger women. Older women would hunt and share with younger women, who would more often take young children to pick fruit or dig geophytes. Others also have described generally friendly and helpful interactions between co-wives (particularly sororal co-wives) across Australia (Roheim 1933:256; Tonkinson 1974).

The Effect of Female Cooperation on Band Composition

Where female foragers rely extensively on cooperative networks to serve economic and reproductive goals, we expect that residential group dynamics will critically reflect these goals. This view is meant to complement, rather than directly counter, previous studies that have focused on the importance of men's goals to the evolution and maintenance of the patrilocal band. Steward (1955), who placed initial emphasis on patrilocality, stressed the importance of a man remaining in his natal territory after marriage, in order to best exploit the area for resources. In updated versions of the model, others focused on different benefits to patrilocality, primarily the presence of other trustworthy men for assistance in hunting and defense (Service 1967; Ember and Ember 1971; Foley 1995). The two hypotheses, often lumped together as the "Steward-Service typology" (Barnard 1983), inspired a great deal of criticism, mainly focused on

the lack of ethnographic evidence of stable patrilocal groups in either culturally specific ethnographic accounts (Lee 1979; Meggitt 1965) or cross-cultural analyses (Lee and DeVore 1968; Marlowe 2000; Murdock 1949). Furthermore, correlations between hunting dominance and patrilocality are hard to find (Ember 1975; Ember and Ember 1971; Kelly 1995). At the same time that the universality of the patrilocal band was being countered, a series of books and papers that emphasized the importance of women's gathering and overall contribution to the forager diet were also emerging, most notably in the edited volume, *Woman the Gatherer* (Dahlberg 1981), but explicit links between these two bodies of criticism were rare. Women's contributions are now widely recognized, but the ways in which those contributions function, especially via cooperation, continue, on the whole, to be left out of analyses on group structure and composition.

In Australia, studies of group composition have centered mainly on men's social, familial, and religious ties. One of the most influential models of group composition in Aboriginal Australia was Radcliffe-Brown's conception of the "patrilineal horde" (1913, 1931). Whereas horde membership was determined by descent through the patriline and was normally exogamous, clan membership was based on birthright. Therefore, a man's daughter would belong to his clan for her entire life, but she was only a member of his horde until she married. A series of ethnographers (Berndt 1955; Hiatt 1962; Meggitt 1962; Warner 1937) working in various parts of the country failed to find evidence of Radcliffe-Brown's patrilineal hordes. Instead, they repeatedly saw examples of flux, flexibility, and fluidity when it came to land use, rendering the horde a virtually meaningless term.

Despite this move away from the prescriptive rigidity of such normative constructs as "patrilocal" and "patrilineal" and a new emphasis on the flexibility and fluidity of band composition, many researchers continue to argue that Aboriginal group structure emerges primarily through the strategic actions of men: men attempting to forge alliances in order to marry (Keen 2006; Lévi-Strauss 1969), men gaining ritual knowledge of distant country and fulfilling ritual obligations (Stanner 1965; Yengoyan 1979), men coercing women into marrying polygynously (Chisholm and Burbank 1991; Keen 1982). A prime example of this is the focus on patrikin as the nexus of the residential group, despite the fact that uxori-patrilocal residence (the husband residing with his in-laws) was the norm in many Aboriginal groups (Peterson 1970; Rose 1960). Explanations for this residential pattern have been attributed dually to the responsibility of children to take care of their elderly parents (the wife's parents being much more likely to be alive than the husband's given age at marriage) and to obligations that the son-in-law has to his in-laws after marriage. The significance and influence of the mother-daughter relationship is rarely mentioned, and female intergenerational transfers of care or resources flowing from elder to younger are mentioned mainly as side effects of the more important transfers that flow upward. This is in stark contrast to the literature on Aboriginal men which emphasizes knowledge transfers from elder to younger as the core of the religious system (Hiatt 1996; Myers 1986; Tonkinson 1974).

It is our goal in this paper to attempt to use historic band composition data among Western Desert Martu to show how women maintained access to same-sex kin throughout their lives. If female cooperative networks were important components of Martu women's economic and social strategies, we would expect that adult women would have more same-sex consanguineal kin present, controlling for age, and that

mothers strategize to give aid to daughters who need it most (younger women without a sister or other female alternative caretaker present).

Study Population

The term *Martu* (a.k.a. Mardu, Mardujarra) refers to both a contemporary and a historic population of Aborigines residing in Australia's Western Desert. Historically, it has been used to denote the Aboriginal population whose traditional homelands spanned a 150,000 km² section of the Western Desert from the Percival Lakes in the north to Lake Disappointment in the south. Currently, the term is used to identify a community of about 800 Aborigines, some of whom continue to reside in outstations within their traditional homelands, and others who have moved to towns and other settlements throughout the state of Western Australia.

There is a broad literature on Martu social organization and history. Tonkinson (1974, 1977, 1978, 1980, 1988, 1990, 1991, 2000, 2007) provides extensive details on Martu identity, religion, gender, politics, autonomy, and change. Daily life in the bush was mainly egalitarian, despite strongly gendered ideologies that pertained to religious life and *Jukurrpa*, or "Dreamtime Law" (Tonkinson 1991). Reconstructions of pre-contact foraging ecology and behavior by Veth and Walsh (1988; Walsh 1990) show that although both men and women participated in hunting and collecting activities, as is the case today, women acquired more of the small game and gathered food, while men acquired more of the larger game. Women's contribution to the diet was historically between 60 and 80% of the total food weight (Gould 1969; Meggitt 1962). Unlike in other regions of the desert, Martu women note that they were not proscribed from touching spears or hunting larger animals and would sometimes hunt kangaroo and emu with their dogs.

Marriage among the Martu was arranged and frequently polygynous. Girls were often promised in marriage very early in childhood, sometimes even before birth, whereas boys were promised to their first wives typically at the time of initiation (Tonkinson 1991). Polygynous unions were common and ideally sororal, but the degree of polygyny was not as extreme as was found among other Aboriginal populations farther north and east. Women had some influence over their husbands' choice to take a second wife, and they would exercise this influence to obtain extra help with domestic duties or to increase birth spacing. Child care, as in many foraging societies, was, and continues to be, indulgent and child-centered (Scelza 2008; Tonkinson 1991).

Our study population includes some of the last groups residing in the Western Desert during the middle of the twentieth century. Until the 1930s the only non-Aborigines in the desert were a few explorers, travelers, and missionaries, which kept contact with the desert groups at a minimum. In the 1950s the government, under the auspices of the Weapons Research Establishment (WRE), began missile testing in the desert, and, as part of their efforts to empty the area of native inhabitants, patrols were sent out to contact and bring in Aborigines living in the affected areas. The patrols occasionally brought rations and supplied medical treatment to bands who did not come in from the desert when contacted, particularly in the 1960s when a period of severe drought ravaged the area. Davenport et al. (2005) have described in detail the international

events and social implications surrounding the interactions between Australian society and remote Martu bands during this period.

The remaining bands of nomadic Martu in the mid-twentieth century clearly cannot be deemed “pre-contact” as the interactions described above certainly had some effect on both their material and social lives. Depopulation of the desert owing to drought and desire to join relatives already living at mission settlements, as well as group movements to either meet or avoid WRE patrol officers, likely altered traditional mobility patterns. However, Peterson and Long, who provided many of the baseline group compositions used in this study, believe these influences were minimal, saying of their census data: “it is assumed the information reflects fairly closely the precolonial social and demographic aspects of group composition and better than any other available” (1986:102).

Methods

Historic group compositions were rarely recorded in detail at the time of first contact. Where information was recorded, it tended to focus on group size and basic demography of group composition (sex ratio, age structure, etc.), as was the case with the censuses conducted by the WRE. Consanguineal relatedness between group members was very rarely recorded beyond initial attempts to lump individuals into nuclear families, assigning children to their social, but not necessarily biological, parents. In order to reconstruct intra-group genealogical relatedness, we used historical reports and interviews to supplement previously recorded group data and register group compositions that had not been previously recorded. In this way we were able to obtain complete group compositions and genealogical information for nine pre-contact bands living in the Western Desert between 1940 and 1965 (Table 1). Five of them were based on reports made at the time of first contact by government patrol, and recorded by Peterson and Long (1986), which we then reconstructed and amended using interviews with living group members. Another was taken from a recently published account of a group’s movements in the time just before contact (Davenport et al. 2005). The three remaining groups were reconstructed through interviews with living group members. Age estimations were made at the time of contact for the groups recorded by Peterson and Long. We corrected these estimations for those individuals still living using methodologies similar to those used for other hunter-gatherer groups (e.g., Howell 1979 for the !Kung; Hill and Hurtado 1996). The same age-estimation techniques were used for members of groups not recorded by Peterson and Long. Using the group genealogies, we constructed relatedness matrices for each group and calculated the number and types of adult kin each adult group member had present. Completed fertility, exact ages, and information about where missing family members were residing were unobtainable in many cases, thus limiting our ability to extrapolate beyond the current dataset.

Results

The nine historic bands consisted of 164 individuals—104 adults and 60 children, where children were defined as those under 14, the age of the youngest married person in our

Table 1 Martu groups in study population

| Map number ^a | Location | Date | Band size ^b | Sex ratio (M, F) | Number of children (<14 years old) | Original recorder ^d | Source |
|-------------------------|------------------|---------------|------------------------|------------------|------------------------------------|--------------------------------|---|
| 1 | Lake Percival | Sept. 1964 | 27 | 8:19 | 11 | W. MacDougall & R. Tonkinson | Peterson and Long 1986 Davenport et al. 2005 |
| 2 | Karlamilyi | Nov. 19, 1963 | 24 | 10:14 | 10 | R. Tonkinson | Peterson and Long 1986 |
| 3 | Karlamilyi North | ca. 1952 | 17 | 3:14 | 12 | R. Bliege Bird | – |
| 4 | Parrngurr | Nov. 19, 1963 | 30 | 15:15 | 12 | R. Tonkinson | Peterson and Long 1986 |
| 5 | Taliwara | Apr. 12, 1964 | 13 | 10:3 | 3 | R. Tonkinson | Peterson and Long 1986 |
| 6 | Tikatika | May 1965 | 14 | 4:10 | 8 | R. Tonkinson | Peterson and Long 1986 |
| 7 | Walawala-Gadada | Oct. 22, 1964 | 8 | 6:2 | 2 | R. Macauley & R. Tonkinson | Peterson and Long 1986 |
| 8 | Jurntu-laltu | ca. 1943 | 21 | 8:13 | 1 ^c | B. Scelza | – |
| 9 | Wintamarra | ca. 1957 | 10 | 0:10 | 4 | R. Bliege Bird | – |

^a Map numbers correlate with group locations shown in Fig. 1

^b The nine listed bands comprise 164 individuals; however, 12 of these individuals were listed as members of two groups. For our analyses each individual was only counted once

^c Many of the group compositions in this study were originally recorded at the time of first contact by either anthropologist R. Tonkinson or Australian government employee R. Macauley during the mid-1960s

^d There were likely an additional two to five children in this group, but the group member interviewed in 2006 was unable to recall the exact number of children present, so we have only included the one known child in our analyses

sample (Table 2). Twelve of the individuals were present in more than one group but were only included once in the analyses. Adult sex ratios were highly female biased (0.63). This is likely to be due at least in part to higher male mobility, male mortality, and the greater propensity of young men to leave the desert to work in missions or on cattle stations (see Myers 1986 for a similar description of Pintupi male mobility across the lifespan). The sex ratio for children under 15 was much closer to normal, at 0.941. Bands ranged in size from 6 to 29 individuals with a mean group size of 18. Half the marriages were polygynous (11 of 23), with 74% of women married polygynously and the number of wives in polygynous unions ranging from 2 to 5 (mean=3.09).

If female cooperative social networks are important components of Martu women's economic strategies, we would expect that (1) adult women would have more same-sex consanguineal kin present than adult men; (2) women continue to maintain access to same-sex kin, particularly mothers and sisters; (3) women are more likely than men to have a mother present during their early childbearing years; and (4) mothers are more likely to be present for daughters who need their aid the most (younger women without a sister or other female alternative caretaker in their group).

Do women have more co-resident same-sex kin than men? Comparisons between adult men and women do show some significant differences in their relations with other group members (Table 3). Although men and women had almost the same number of consanguineal kin in their group on average, women's ties (mean coefficient of relatedness [CR]=0.111) were closer than men's were (mean CR=0.08). This difference held both for the entire adult population and for the married subset of the population. Women were also surrounded by twice as many same-sex kin (2.7) as men (1.3) (*t*-test, *p*=0.0001). This difference becomes even stronger when we consider only married adults. Married women averaged 2.32 same-sex consanguineal kin while men averaged only 0.71.

Table 2 Study population demographics

| Variable | Total population | | Married population | |
|------------------------|------------------|-----------|--------------------|------------|
| | Men | Women | Men | Women |
| Number in population | 61 | 91 | 23 | 49 |
| Adults (14+) | 34 | 58 | – | – |
| Children | 27 | 33 | – | – |
| Percent of population | 40 | 60 | 15 | 32 |
| Adults (14+) | 22 | 38 | – | – |
| Children | 18 | 22 | – | – |
| Age (mean±s.d.) | 21.5±15.9 | 23.0±18.8 | 43.5±13.24 | 28.2±12.14 |
| Min, max | 1, 63 | <1, 55 | 27, 65 | 14, 55 |
| Population breakdown | | | | |
| 0–13 years | 27 | 33 | 0 | 20 |
| 14–25 years | 10 | 24 | 7 | 12 |
| 26–40 years | 11 | 17 | 4 | 7 |
| 40+ years | 12 | 15 | 12 | 10 |
| Marriage | | | | |
| % Adults married | 68 | 84 | | |
| % Married polygynously | 52 | 74 | | |

Table 3 In-group kinship determinants for men and women (*t*-tests)

| | Total population | | | | Married population | | | |
|---|------------------------|--------------------------|----------|-----------------|------------------------|--------------------------|----------|-----------------|
| | Men (<i>N</i> =61) | Women (<i>N</i> =91) | <i>t</i> | <i>p</i> -value | Men (<i>N</i> =23) | Women (<i>N</i> =49) | <i>t</i> | <i>p</i> -value |
| Average relatedness to members of group | 0.080 | 0.111 | 2.13 | 0.036 | 0.061 | 0.0972 | 2.39 | 0.020 |
| Number of consanguineal kin | 3.59 | 3.89 | 0.456 | 0.649 | 3.00 | 3.59 | 0.739 | 0.462 |
| Number of same-sex consanguineal kin | 1.32 | 2.67 | 3.84 | 0.000 | 0.783 | 2.33 | 4.57 | 0.000 |

Do women continue to maintain access to mothers and sisters after marriage? Access to sisters is primarily maintained via sororal polygyny. Fifty-one percent of married women were in sororally polygynous unions (married to either a sister or a “cousin sister”), and 68% of women married polygynously were in sororal unions. Women also maintained co-residence with their mothers: among the 40 married women ages 14–40, exactly half had their mother present in the group. Looking at the trend from the mother’s perspective, of the women 40 and over, 62% were living in a group with their adult daughter. In comparison, 32% of adult men had their mother present, and this number drops to 17% for married men. A chi-square test showed a significant difference in maternal co-residence for men and women ($\chi^2=3.87$, $p=0.049$). We might expect this result from the fact that women married at younger ages than men, and an older man is simply less likely to have a living mother. Our demographic data shows that among married adults, men’s age estimates average 10 years older than women’s (see Table 2).

To further investigate the effects of age and gender on maternal co-residence after marriage, we first looked at correlations between age and maternal co-residence for both men and women (Fig. 2). The correlation for married women (Spearman’s $Rho=-0.0513$, $p=0.0002$) was much stronger than it was for married men, where there was no significant correlation between age and presence of mother (Spearman’s $Rho=-0.139$, $p=0.529$). Next, we performed a logistic regression on all married adults with the dependent variable of maternal co-residence (present=1, absent=0) (Table 4). In the full model, with independent variables of age and gender, only age was a significant predictor of maternal co-residence ($p=0.002$). However, when we broke out the model by gender and looked at the effect of age, it was predictive of maternal co-residence only for women ($p=0.003$ vs. $p=0.872$ for men). To summarize, these results show that: (1) mothers co-reside with sons less frequently than they do with daughters, (2) mothers are likely to co-reside with their sons at all stages of their lifespan equally, and (3) mothers are more likely to co-reside with their daughters when their daughters are younger.

If mothers are strategizing to live with daughters who need them most, we might expect there to be differences in the likelihood of a mother’s presence according to marital type. Mothers should be most likely to be present if women are in a monogamous union and least likely when their daughters are sororally polygynous. Of women between 14 and 40 years of age, those monogamously married were more than twice as likely to have their mother present than women of the same age range who

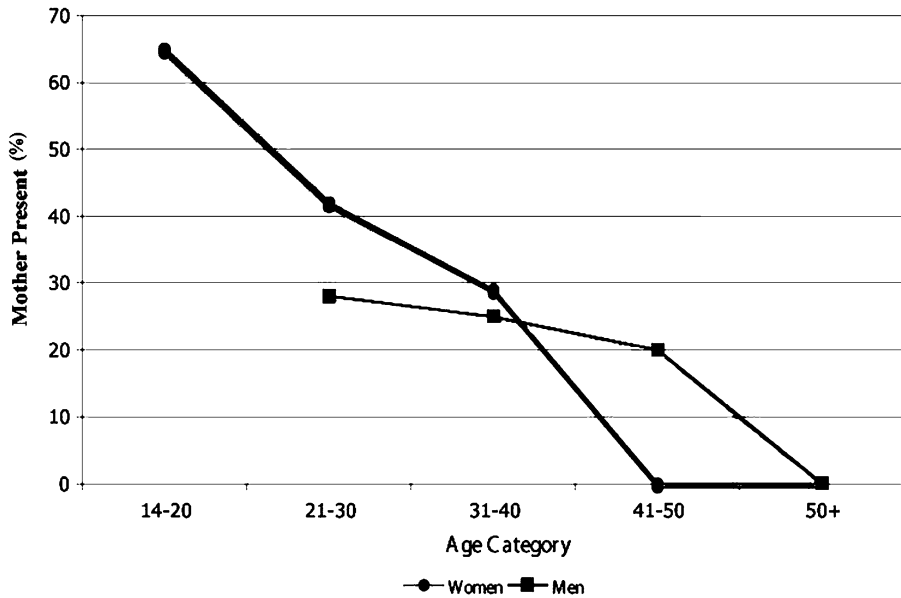


Fig. 2 Maternal co-residence across the lifespan for married adults

were married polygynously ($\chi^2=6.537$, $df=1$, $p=0.011$). However, contrary to our hypothesis, women were not less likely to co-reside with their mothers when sororally polygynous (compared with women in monogamous unions; $\chi^2=0.276$, $df=1$, $p=0.599$). Among polygynously married women, those who had a sororal co-wife were more likely than non-sororal polygynous women to have their mother present ($\chi^2=4.644$, $df=1$, $p=0.031$). Mothers thus are more likely to be present when daughters are in monogamous unions, but they are equally likely to be present when daughters are married sororally.

Discussion

Because of the limited, opportunistic and retrospective nature of this dataset, it is difficult to determine how representative this sample is of the larger, historic population.

Table 4 Effects of age and gender on maternal co-residence

| Model | Variable | Odds ratio | Standard error | Z | p-value | 95% CI |
|-------|----------|------------|----------------|-------|---------|-------------|
| Full | Gender | 0.937 | 0.707 | -0.09 | 0.931 | 0.214–4.109 |
| | Age | 0.903 | 0.029 | -3.13 | 0.002 | 0.847–0.962 |
| Women | Age | 0.875 | 0.039 | -3.01 | 0.003 | 0.802–0.954 |
| Men | Age | 0.958 | 0.046 | -0.90 | 0.366 | 0.872–1.052 |

Three models of logistic regression: dependent variable is the presence or absence of co-residence in mother-offspring pairs. Likelihood ratio tests: full model, $\chi^2=18.88$, $df=2$, $p=0.0001$; women, $\chi^2=15.65$, $df=1$, $p=0.0001$; men, $\chi^2=0.91$, $df=1$, $p=0.3398$

Details such as the transience of male members and the location of other relatives not with the group at the time of recorded contact were often unobtainable, and we therefore had to limit our study to one of group composition and kinship. Even so, we were unable to obtain complete family histories for all group members. The study would clearly have been enhanced by a more complete knowledge of whether family members not in the groups were deceased or living elsewhere. Despite this lack of information, we have been able to provide more detailed statistics on group structure than have previously been recorded, or will likely ever be recorded, for this population of Western Desert Aborigines.

Despite the limitations of the dataset, we are confident that this sample is representative of band composition during the time period immediately preceding the final exodus from Martu homelands. Our data support the general argument that postmarital residence was flexible and groups were almost always composed of members of both the husbands' and wives' families. In particular, during the critical childbearing years, women tended to have more, and more closely related, relatives around than their husbands; maintained particularly strong links to their mothers; and continued to depend on their sisters through the institution of sororal polygyny.

Much of the debate over group composition has centered around terminological differences: horde vs. clan vs. local group, and so on (Hiatt 1996; Martin and Stewart 1982; Peterson 1975). These arguments often become centered around men, as the patrilineal nature of the ownership of sacred sites and "country" is less disputed. To expand discussions about residence to include the female perspective, we need to address questions about how women might benefit from strategizing to live with kin. What are the benefits of having cooperative partners in the desert environment? How does a woman's reproductive timing correlate with her access to key allomaternal care providers among her kin? What are the benefits of sororal polygyny for women, and how does its prevalence affect the movements of elder kin, especially mothers?

The Mother-Daughter Bond and Further Evidence for Cooperative Breeding

One enduring image of patrilocal residence is that of a daughter leaving her parents to live among strangers in her husband's camp. Among historic Martu, it was more likely that husbands joined wives, that wives joined sisters already present, and that wives brought mothers to their marriages. Martu women retained ties to their consanguines after marriage, and most continued to reside with them for the majority of their lives. We have focused here on the mother-daughter relationship as a conduit for intergenerational cooperation. What benefits might accrue from the maintenance of this relationship? One possibility is suggested by the nature of Martu subsistence, which was critically dependent on the provisioning of small animal prey for much of the year (Bliege Bird and Bird 2008). Women, particularly elder women, were the most active hunters. Such hunting requires skill, mobility, and concentration, and today is rarely attempted while carrying small children. Might Martu women have cooperated in an intergenerational division of labor? Quantitative evidence collected among modern Martu populations shows that elder women continue to be extremely productive foragers (Bliege Bird and Bird 2008) and that they are primary care providers for their daughters (Scelza 2008), making mothers a prime candidate to team up with their adult daughters in

hunting and child-care cooperatives. Elder women interviewed about their lives in the bush emphasized this point:

Women would get help from their mothers to raise children. The old lady would stay at camp and watch the babies while the mother goes out hunting. Then the next day, they would switch. Young women who were the same age used to work together too, helping each other out, even sharing mimi [breast milk] with each other's babies (N.T., 2006 interview).

One possible confound in our dataset is that in many cases we do not know whether an absent mother is deceased or residing elsewhere, or whether elder women have living daughters they could be helping. This limitation may actually strengthen our results since we assume that a lack of co-residence indicates choice rather than mortality. A closer look at the data on elder women helps to clarify this point. Of the 16 women over age 40, 10 were residing with an adult daughter. Of the six who were not, three of these women still had young children resident with them. Two others were living with nieces. This leaves only one elder woman living apart from close female kin of the subsequent generation.

There is evidence of maternal strategizing in other foraging societies where women contribute significantly to subsistence. A study of Hadza residence patterns, for whom more complete reproductive and residential histories were available, showed that 68% of women whose mothers were alive resided in the same camp with them and that elder women were more often found living with their daughters than with their sons, and more specifically lived more often with daughters who were nursing and those who did not have an elder daughter living with her (Blurton Jones et al. 2005). Although we do not have this level of detail in our dataset, we suspect that similar motivations might be in play. It is well known that Aboriginal women play a role in marriage arrangements for their daughters (Hamilton 1970; Hiatt 1996). Brideservice arrangements are most often invoked in discussions of why couples might reside with the wife's parents after marriage. It should be considered, however, that in an economy with a substantial female contribution to subsistence, the mother might be negotiating for this residence pattern, not only because of the upward flows from the son-in-law but also because of the potential for downward flows from mother to daughter at a critical stage in the daughter's reproductive career.

Implications for Understanding Polygyny in Australia

The mother-daughter bond becomes even more interesting when viewed in conjunction with the trend toward sororal polygyny. Polygyny in general, particularly “gerontocratic polygyny” (Hiatt 1985) in Australia, has always seemed at odds with other egalitarian hunter-gatherers, primarily because the dominant explanations for its prevalence have centered on male power and coercion (Chisholm and Burbank 1991; Keen 2006). If men benefit at the expense of their wives, polygyny can only be explained through imbalances in bargaining power; in other words, men have the power to coerce women into entering polygynous marriages when they would rather be married monogamously. This argument has been well supported by studies of polygyny among non-foragers around the world, emphasizing higher costs in terms of fertility and child

health for women married polygynously compared with their monogamous counterparts (Borgerhoff Mulder 1988; Dorjahn 1958; Hern 1992; Josephson 2002; Strassman 1997; Van Beek 1987), but coercive polygyny among hunter-gatherers is rare. The relative advantages of sororal polygyny have been well established (see White 1988 for a review), the most notable being a lower incidence of jealousy and conflict than exists between unrelated co-wives, evident by the fact that sororal co-wives are much more likely to be co-resident (Murdock 1949:31). The implication here is that the co-wives are more likely to help each other when they are related, whether this is rationalized from an evolutionarily-based kin selection perspective or from a cultural viewpoint focused on trust and familial bonding. Our ethnographic interviews also support this idea:

My sister and I were both married to the same man. . . . She was like a mother to me. We got along very well and never fought. Fighting happens more when you have five wives, not two. . . . Sometimes we would hunt together, or one of us would go out with our husband to get meat while the other would stay with the children and get seed or fruit (J.B., 2006 interview).

In addition to the already noted cooperative benefits that can occur when co-wives work together, our data reveal an auxiliary benefit to sororal polygyny in the form of maternal assistance. We found that women married sororally were significantly more likely to have their mother present than those who were married polygynously with an unrelated co-wife. If maternal strategizing is taking place, it makes sense that the mother would opt to locate herself where she could help two or more daughters instead of only one. Sororal polygyny then might be one way that women can secure help from their mothers because it limits inter-familial female dispersal. The only other quantitative study of polygyny in Western Australia reached a similar conclusion. Chisholm and Burbank (1991:305), although generally siding with a more coercive model of polygyny, found that sororal polygyny had a distinct set of characteristics and benefits and concluded that sororal and non-sororal polygyny should be considered as different from one another as polygyny and monogamy are. They found that although there was no difference in the proportion of pregnancies surviving to age 5 between monogamous and polygynous women, the difference between non-sororal and sororal wives, while only marginally significant, jumped from 76.7% to 89.1%, respectively. Birth intervals were also longer for sororal wives, suggesting that these women might have an advantage in strategizing toward quality over quantity in sororal unions, and that this might be advantageously affecting their reproductive success.

Conclusion

Our analysis of the pre-contact demographics of bands in the Western Desert shows that despite predominantly patrilineal inheritance structures, residential patterns support the hypothesis that females tended to cluster with close kin. Among Australian hunter-gatherers, and perhaps in foragers more generally, a normatively patrilocal residential pattern does not necessarily preclude the presence of a woman's kin, particularly her mother and sisters. The prevalence of more flexible, bilocal residence may have important repercussions on the existence and maintenance of female cooperative networks,

especially when combined with a preference for sororal polygyny. Interpreting polygyny as a conduit for female cooperation sheds new light on the power structures and the cost-benefit analysis of this marital form. Blending studies of polygyny with those on group composition also helps to piece out the dynamics of female cooperation in order to better understand how female relationships might be maintained across the lifespan.

Acknowledgments This work has been generously funded by the National Science Foundation (BCS-0514560) and a Fulbright Postgraduate Award from the Australian-American Fulbright Commission. Drafts of the manuscript were greatly improved by comments and discussions with Eric A. Smith, Doug Bird, Bob Tonkinson, Donna Leonetti, and Steve Goodreau. We especially want to thank the residents of Parnngurr, Punmu, and Kunawarritji communities for their friendship, patience, and willingness to share the details and stories of their lives in the bush.

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