



## Why Polyandry Fails: Sources of Instability in Polyandrous Marriages

Nancy E. Levine; Joan B. Silk

*Current Anthropology*, Vol. 38, No. 3. (Jun., 1997), pp. 375-398.

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*Current Anthropology* is currently published by The University of Chicago Press.

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# Why Polyandry Fails

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## Sources of Instability in Polyandrous Marriages

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by Nancy E. Levine and  
Joan B. Silk

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Polyandry has long been viewed as an anomalous form of marriage that raises fundamental questions about variability in human kinship systems. This paper integrates and evaluates a set of hypotheses derived from sociocultural anthropological and evolutionary biological theories of polyandry against data collected on the Nyinba, a well-studied ethnically Tibetan population living in northwestern Nepal. In this population, polyandry is fraternal; it is the normative form of marriage and highly valued culturally. Nonetheless, certain polyandrous marriages fail—men occasionally leave their natal households and abandon their joint marriages. In exploring the reasons for these marital breakdowns and the characteristics of men who instigate them, this paper offers a new perspective on the presumed contradictions of polyandry and a more fruitful approach to understanding how polyandrous practice comes to be perpetuated from one generation to the next. It also contributes to discussions about how sociocultural and evolutionary perspectives may provide complementary viewpoints for ethnographic data analysis.

NANCY E. LEVINE is Associate Professor at the University of California, Los Angeles (Los Angeles, Calif. 90095-1553, U.S.A.). Born in 1948, she was educated at Reed College (B.A., 1970) and at the University of Rochester (M.A., 1972; Ph.D., 1978). Her research is focused on the impact of economic and legal reforms on herd management and household systems among Tibetan nomadic pastoralists. Her publications include *The Dynamics of Polyandry* (Chicago: University of Chicago Press, 1988), "Differential Child Care in Three Tibetan Communities: Beyond Son Preference" (*Population and Development Review* 13:281-304), and "Fathers and Sons: Kinship Value and Validation in Tibetan Polyandry" (*Man* 22:267-86).

JOAN B. SILK is Professor and Chair of the Department of Anthropology, University of California, Los Angeles. She was born in 1953 and educated at Pitzer College (B.A., 1975) and the University of California, Davis (M.A., 1978; Ph.D., 1981). Her research interests are in primate social behavior and reproductive strategies, behavioral ecology, and adoption and fosterage in human societies. She has published "Patterns of Intervention in Agonistic Contests among Male Bonnet Macaques," in *Coalitions and Alliances in Humans and Other Animals*, edited by S. Harcourt and F. de Waal (Oxford: Oxford University Press, 1992), (with D. L. Cheney and R. M. Seyfarth) "The Form and Function of Post-Conflict Interactions among Female Baboons" (*Animal Behaviour* 52:259-68), and (with R. Boyd) *How Humans Evolved* (New York: Norton Press, in press).

The present paper was submitted 16 IX 96 and accepted 23 IX 96.

Fraternal polyandry is the normative form of marriage among the Nyinba, an ethnically Tibetan population in northwestern Nepal. Despite this, polyandrous Nyinba marriages sometimes fail, and one or more of the co-husbands leave the common marriage to form a new household. The goal of this paper is to identify factors at the level of household and individual that influence the stability of these marriages.<sup>1</sup> The findings contribute to an ongoing debate about the causes of variability in marital systems derived from two theoretical paradigms: sociocultural anthropology and evolutionary biology.

We begin with a brief review of the literature on polyandry, focusing on theories about why polyandry occurs in human societies. Then we consider the factors that sociocultural and evolutionary theories have identified as likely to affect interpersonal and sexual relationships within polyandrous marriages and the stability of polyandrous households. Next, we provide an ethnographic account of polyandry among the Nyinba. Demographic and economic data collected by Levine are used to evaluate putative sources of stress in polyandrous households. Finally, we consider factors that may contribute to the cross-cultural rarity of these sorts of marital arrangements.

### Causes of Polyandry

Until recently, sociocultural accounts of polyandry focused largely on explaining why specific societies are polyandrous. That is to say, scholars were concerned to show why such an exotic arrangement—to which humans seemed poorly suited—occurred as a group-level phenomenon. The 19th-century evolutionists saw the dispersed modern occurrences of polyandry as "survivals" from a more primitive epoch in human history (see McLennan 1876 [1865]:137, 139). Westermarck, who was the first to turn to synchronic explanations, identified a set of "co-existing conditions," or predictors for polyandry, including high sex ratios at birth, resource limitations, geographical circumscription, and prolonged absences of husbands from home (1926:258-60, 264). These factors still figure in many contemporary discussions of the origin and maintenance of polyandry.<sup>2</sup>

British social anthropologists, who carried out field research in polyandrous societies in the mid-20th century, focused on endogenous causes and holistic explanatory frameworks. For Leach, Sri Lankan polyandry was a means of resolving social structural contradictions created when men and women both inherited substan-

1. Thanks are due to R. Boyd, A. T. Carter, W. Durham, S. B. Hrdy, E. Smith, T. Fricke, M. Bergerhoff Mulder, and K. Haddix for their comments on earlier drafts of the manuscript.

2. Cassidy and Lee have recently updated societal-level explanations of polyandry and suggested that its causes lie in "the combination of the harsh environment with a limited productive role for women" (1989:9).

tial property and brothers maintained joint ownership of land. Under such circumstances, brothers found their interests divided by their wives' distinct property shares—a problem that could be avoided by polyandry (1966 [1955]). To this discussion Tambiah (1966:285, 298, 303–5, 316–17) added a concern with individual choice and decision making. He described Sri Lankan polyandry as one of a number of culturally sanctioned strategies for dealing with growing land fragmentation. Polyandry benefited individuals and families by preserving large parcels of land, supplementing inadequate male labor, and increasing the likelihood that one adult male would be at home while others were absent (citing Gough 1952, 1959, 1961 for parallels with the Nayar case).

Subsequent studies have continued to stress the benefits of polyandry for both individuals and their society and have suggested that these advantages are particularly critical for economic success in resource-scarce environments. In the Indian Himalayas, where polyandry is commonly combined with polygyny, the beneficial consequences identified include less land fragmentation, diversification of domestic economic activities, and lower rates of population growth (Chandra 1987: 148; Majumdar 1962:75; Parmar 1975:127–50; Saksena 1962:24–25). Scholars have also argued that this system, commonly termed “polygynandry,” facilitates adjusting the household workforce to the needs of dependents and to the available resource base.<sup>3</sup> Goldstein (1976, 1978) similarly described polyandry in an ethnically Tibetan community in northwestern Nepal as an adaptation to a circumscribed environment. Here, he asserted, individuals married polyandrously in order to avoid dividing family estates and to solidify wealth and class advantages when external economic opportunities were limited (1978a:326, 329). These conscious goals were separate from the postulated latent functions of the system: restraining population growth and homeostatic adjustment of group size to resources (Goldstein 1976:231; 1978:330, 335).<sup>4</sup>

For those interested in the evolution of behavior, the existence of polyandry is problematic because it appears to limit male reproductive success, defined as the num-

ber of surviving offspring produced. Males who share access to a single female are likely to leave fewer descendants than males who monopolize access to their mates. By the same token, a man who marries polyandrously can expect to sire only a fraction of one woman's children. Thus, the existence of polyandry in human societies seems to contradict the general prediction that evolution will favor the development of behaviors that increase the ability of individuals to survive and reproduce.

Along with many sociocultural anthropologists, evolutionary biologists generally contend that polyandry is practiced when economic, ecosystemic, or demographic circumstances limit individual men's ability to support women and their children adequately. Alexander (1974: 371) suggested that polyandry is “related to the low *and* reliable productivity of farms, with the result that additional labor without additional children (that is, more than a single male per family) has come to be the best route to long-term maximization of reproduction because of the necessity of maintaining the minimal acceptable plot of land.” Crook and Crook interpreted polyandry in Zanskar, northwestern India, as a “response to an ecology where the carrying capacity of the land is not only restricted but subject to severe seasonal constraints” (Crook and Crook 1988:99; see also van den Berghe and Barash 1977:811 and Durham 1991:100 on this subject).<sup>5</sup>

A corollary of the view that polyandry is a response to specific environmental constraints is the idea that men who marry polyandrously actually may have greater reproductive fitness than those who marry monogamously or polygynously.<sup>6</sup> However, the two quantitative studies of the reproductive consequences of polyandry have reached very different conclusions about this issue. While Beall and Goldstein (1981) found that polyandrous men in northwestern Nepal reproduced less successfully than monogamous men, Crook and Crook (1988) reported that in Zanskar polyandrous men produced slightly more children than monogamous men. The conclusions of both studies must be viewed with some caution because no information about the paternity of children born in polyandrous households was available.

3. Berreman (1978:343) stated that the range of marital choice “affords economically advantageous flexibility to a household. Where an expensive brideprice is required, or where land is scarce, fraternal polyandry may be a good solution to the need for a wife. . . . Where land is ample and labor is short, monogamy may be the answer . . . or polygyny may be preferred” (see also Majumdar 1962: 76). Both Berreman (1962:65; 1978:344) and Majumdar (1962:76) nevertheless caution that not all Himalayan hill communities practice polygynandry despite seemingly identical environmental and economic circumstances.

4. In this model, polyandrous marriage systems serve as societal-level mechanisms which adjust population to resources. They do so by permitting monogamy when economic opportunities expand. Monogamy, however, produces population growth and increased pressure on resources, conditions which prompt a return to fraternal polyandry. This is postulated as a feedback relationship whose adaptive advantages remain unrecognized by social actors (Goldstein 1976:232–33; 1978:33; see also Crook and Crook 1988: 102).

5. Crook and Crook also stress how polyandry enhances adaptation to a high-altitude arid environment which is characterized by limited carrying capacity, severe seasonal constraints, and exactions of state and landlords. As in Goldstein's model, polyandry is seen as curbing population and maximizing the labor force per household (Crook and Crook 1988:99, 102; 1994:760–61).

6. Although we do not specifically consider women's perspective on polyandry, it is worth noting that polyandry is likely to influence female as well as male reproductive success. If having several husbands increases a woman's access to resources or influences her children's welfare, women who marry polyandrously may actually be better off than women who marry monogamously. In Ladakh, monogamously married women produced on average 3.1 children while their polyandrous counterparts produced 5.2 (Crook and Crook 1988:106). However, polyandry is also expected to increase the variance in female reproductive success, since in polyandrous societies with balanced sex ratios many women are likely to remain unmarried (Crook and Crook 1988:106–7).

Thus the functional explanations of human polyandry proposed by sociocultural anthropologists are similar to those proposed by evolutionary biologists, and both kinds of explanations are subject to the same criticism—namely, that it is difficult to establish a consistent connection between specific economic, ecological, or demographic variables and the presence or absence of polyandry. Among Tibetan agricultural populations in northwestern Nepal and western Tibet, for example, no sociocultural, political, economic, or demographic factor reliably predicts the incidence of polyandry. Berreman found no correlation between the presence of polyandry and any identifiable factor among Indian Himalayan groups and attributed the distribution of polyandry to culture history (1978:344). Finally, there are no commonalities among polyandrous societies that distinguish them unambiguously from nonpolyandrous societies around the world.<sup>7</sup>

### Sources of Stress in Polyandrous Marriages

Sociocultural and evolutionary biological explanations of the societal-level sources of polyandry overlap at several points. Analyses deriving from these two bodies of theory concur in the assumption that polyandry is a difficult form of marriage that is perpetuated because of its adaptive consequences for the society and its economic advantages for individual participants. A corollary of this assumption is that men will leave polyandrous households whenever they can afford to do so. While sociocultural models focus on the proximate sources of conflict and stresses that may disrupt polyandrous marriages, evolutionary analyses emphasize the ultimate selective factors that underlie such conflict.

Ethnographic studies indicate that polyandrous marriages generate certain types of problems and tensions among co-husbands. Men may resent perceived inequities among co-husbands, particularly the younger brothers, who are dominated by their elder siblings. Men may have unsatisfactory interpersonal and sexual relationships with their wives, particularly those who have older wives (Ekvall 1968:27; Goldstein 1971:73; 1976:232; 1978:328), as youngest brothers often do. Among the Nyinba disappointed expectations of fathering children, particularly in large sibling groups, reportedly contribute to dissatisfaction with polyandrous marriages. Tensions within polyandrous households may be exacerbated when the co-husbands do not have the same parentage. In Sri Lanka, where polyandry is not always fraternal, co-husbands who are brothers have more stable marriages than unrelated men (Tambiah 1966:286–87, 298; see also Hiatt 1980).<sup>8</sup> Among the Ny-

inba, Levine (1988:152) has suggested that co-husbands who have different parents are less tolerant of inequities than co-husbands who have the same parents.

In evolutionary analyses, men's contentment with their marriages is expected to be linked to the reproductive consequences of polyandry. Thus, disparity in age among husbands and wives is expected to be an important source of dissatisfaction because men remain fertile far longer than women. A man who is much younger than his wife may be concerned about her ability to produce children in the future. This may be a particular concern for men of high birth order, since marriages are likely to be contracted by or for first-born brothers.<sup>9</sup> Cross-cultural data suggest that evolution has shaped human psychology and created strong preferences among men for wives who are younger than themselves (Buss 1989). A man's success in fathering children also may influence his decision to maintain or dissolve a polyandrous marriage. If reproductive success varies among co-husbands, then the men who have fathered few children may be prone to initiate partition.

Evolutionary theory also predicts that polyandry is more likely to occur among related than among unrelated males. The degree of relatedness among males who share access to mates is important, because the theory of kin selection predicts that unreciprocated altruism will be restricted to kin. Altruism is defined by biologists as an act that reduces the genetic fitness of the donor and increases the genetic fitness of the recipient. Kinship provides a mechanism for the evolution of altruistic interactions because relatives are descended from a common ancestor and are therefore likely to share some fraction of their genetic material (Hamilton 1964). Sharing access to a wife is a particularly striking example of altruism because men who permit other men sexual access to their wives directly reduce their own reproductive success (Beall and Goldstein 1981:6). A number of researchers have noted that the reproductive costs of polyandry may be offset if co-husbands are close kin (Hiatt 1980:587; van den Berghe and Barash 1977:812).<sup>10</sup> While virtually all co-husbands in Tibetan

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our only information on these practices, unfortunately, they neglect the details of co-husband relationships, how these relationships were affected by kinship proximity and status differentials, how kinship and status affected sexual access to the common wife, and how paternity was allocated to the different men (see Otterbein 1968 [1963]).

9. In the community studied here, men typically select wives a few years younger than themselves. When parents arrange marriages, they try to select a girl intermediate in age between their older sons to ensure compatibility. Many also wish to select a girl mature enough for the prompt production of heirs.

10. The theory of kin selection does not imply that reproductive equity among co-husbands is favored. Nor does it mean that the reproductive interests of parents and their children are congruent (Alexander 1974:372). Since men are more closely related to their own children than to their brothers' children, co-husbands may compete with each other for reproductive opportunities, and reproductive success among brothers may vary (Crook and Crook 1988:110). For parents, it does not matter which of their sons fathers their grandchildren—grandparents are equally closely related to all of their grandchildren. If the fitness of grandparents is mainly in-

7. Two generalizations can be made. First, the majority of known polyandrous societies are agriculturalist or horticulturalist. Second, fraternal polyandry is associated with patrilineal descent and virilocal residence.

8. The Marquesan Islands offer the only known instance of nonfraternal polyandry (often coupled with polygyny) in which the husbands coresided. Nineteenth-century travelers' accounts provide

polyandry come from a single household, their relationships to each other vary, depending on the marital arrangements of the previous generation. If the reproductive costs of polyandry are offset by the reproductive gains accrued by close kin, then it might be predicted that most stable and cohesive polyandrous households will be composed of men who are closely related to one another.

Not all those who believe that evolution has shaped human behavior would endorse this last prediction. Some researchers, who call themselves evolutionary psychologists or Darwinian psychologists, believe that evolution has shaped the psychological mechanisms that underlie human behavior (Cosmides and Tooby 1992, Symons 1992). These mechanisms evolved during the tens of thousands of years in which humans were foragers and lived in small, egalitarian groups of closely related individuals. If polyandry plays no role in this scenario, then human males may not be equipped with psychological mechanisms that temper sexual jealousy or concerns about paternity when rivals are related.

A final source of insight about the factors that influence the stability of polyandrous marriages comes from polyandrous peoples themselves. Emic evaluations of this kind may influence individuals' decisions about their marriages and thus merit special attention. When asked what undermines polyandrous marriages and leads to their dissolution, the Nyinba mention the size of the sibling group, the closeness of kinship among co-husbands, the extent of landholdings or the ease of access to reclaimable land, the success of the relationship with the common wife, and the presence or absence of "own children" within the marriage (see also Levine 1988:257).

These theoretical and ethnographic sources provide a rich set of hypotheses about the factors that influence the stability of polyandrous marriages. We have tested these hypotheses about the causes of marital dissolution among the Nyinba in two ways. First, we examined whether each of the hypothesized factors was associated with the probability that a man would leave his polyandrous marriage. Second, we examined whether the separation from the old and entry into a new marriage produced improved marital circumstances in ways that the hypotheses would lead us to expect. Did men, for example, leave older women for younger ones? Did men selectively align themselves with their closest kin after partition?

## Setting and Sources of Data

The Nyinba are situated at the interface between Nepali-speaking caste Hindu and Tibetan worlds. They

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fluenced by the amount of care, nourishment, protection, and so on, that their grandchildren receive and a single man is unable to provide for all the needs of one woman's children, then parents should encourage their sons to marry polyandrously and contribute to the joint household economy (Alexander 1974:372).

are, however, unambiguously Tibetan in language and culture, displaying strong similarities to agriculturalist groups of western Tibet. There are four Nyinba villages, situated between 9,500 and 11,000 ft. on gently sloping hillsides above major rivers. Cultivated lands range approximately 1,000 ft. below and above these villages, with alpine valleys above the fields devoted to summer pasturage. Like other ethnic Tibetans in Nepal, Nyinba support themselves through a combination of agriculture, herding, and long-distance trade. Recent years have seen declining profits and growing risks in various sectors of the economy. Agriculture has become less profitable as population growth has created more pressure on land, pastoralism has contracted as grasslands have been converted to agricultural use, and trade has become less reliably profitable because of the destabilization of commerce with Tibet. Despite these adverse conditions, Nyinba are adapting to change and continue to maintain a respectable standard of living. The majority of households produce adequate food even in years of poor harvest or trading failures. Their houses are well built and comfortable, people are adequately clothed, and villages manage to maintain a rich ceremonial life. Perhaps the most striking feature of the Nyinba socio-cultural system is the extremely high incidence of fraternal polyandry, in rare circumstances accompanied by polygyny.

Levine conducted 22 months of ethnographic fieldwork in Nyinba villages in 1973–75 and 1982–83. This research yielded various sources of data used in this paper, including a census and household survey, retrospective fertility and marital histories, interviews about the precipitating causes of and property settlements following household partitions, attributions of paternity in polyandrous marriages, and genealogical materials. Details on data collection strategies and limitations in the data sets are provided in appendix A. Different sampling strategies were followed in different circumstances. In particular, the census and household survey involved a random cross-section of the population, while information was collected for every partition event that had occurred over the past 25 years. Consequently, partitions are overrepresented in the data set. Oversampling partitioners does offer one benefit: a broader vantage point for assessing factors implicated in such events.

## Nyinba Polyandry

In 1983 the Nyinba numbered 1,332–716 men and 616 women. This population was subdivided into two largely endogamous social strata: the numerically dominant landholders and the descendants of slaves who were emancipated in 1926. This paper will focus on the landholding stratum, which comprises the vast majority of the population (1,152), primarily because there are different traditions in slave kinship and marriage that still affect the practices of their descendants today and

special cultural and socioeconomic constraints on those marriages.<sup>11</sup>

In Nyinba landholding families, brothers jointly wed a single woman when one or more of the brothers has reached adolescence. The same rule obtains regardless of the number of brothers, and, in consequence, approximately 70% of 150 surveyed Nyinba marriages had begun with two or more brothers. Over time, however, the proportion of polyandrous marriages and the number of brothers within existing polyandrous marriages inevitably declines because of the death of co-husbands, out-marriage, and, occasionally, partition. Thus, a cross-sectional analysis carried out in 1983 showed that only 74 (49.3%) of the sampled marriages were still polyandrous. One-third of the newly monogamous marriages can be traced to household partitions. Once they are established, these monogamous marriages, like all others, will persist throughout the partners' lifetimes.

Bifraternal polyandry is the commonest situation. Among marriages with one wife or one fertile wife, 55% involved two brothers, 28% involved three brothers, and only 17% involved four or more brothers. Trifraternal polyandry, nonetheless, has a high value culturally and is considered desirable economically, since each brother can specialize in one sphere of the tripartite Nyinba economy: farming, herding, or trading. Marriages with more men are said to be prone to discord and difficult to sustain (Carrasco 1959:36; Goldstein 1971:68). For this reason, young girls express reluctance to enter into such marriages, and their concerns are echoed by their parents, who are responsible for arranging marriages. Various mechanisms were employed to limit the number of marrying brothers in Western and Central Tibet as well, including sending sons off to join a monastery, to find their fortunes elsewhere, or to marry heiresses.

As in other regions of Tibetan language and culture, Nyinba polyandry coexists with occasional polygyny. This inevitably occurs in instances of infertility and may also occur when one or more co-husbands become deeply dissatisfied with the common wife and add a second wife to their marriage. The latter circumstance, polyandry and polygyny with two fertile women, forming a "conjoint marriage," has important consequences.<sup>12</sup> It partly severs the formerly collective marriage, since sexually exclusive partnerships tend to form. Conjoint marriage has three further consequences. First, it offers polyandrous men additional op-

portunities for having their "own children." Second, it creates an ever-present risk of partition, although a number of such complex unions have persisted throughout the partners' lifetimes.<sup>13</sup> Third, it produces children with different fathers and mothers. Most of these mothers are unrelated women, although one-third are sisters or half-sisters, themselves born of a polyandrous marriage.

In contrast with Tibetan polyandry as reported elsewhere, Nyinba place great emphasis on the paternity of children; one brother is identified as the "real" (*ngothog*) father, that is, the man believed to be responsible for the child's conception.<sup>14</sup> The mother generally takes the initiative in deciding who the father might be in accordance with local theories of conception, which hold that women are likeliest to become pregnant in the second week of their menstrual cycles. A woman's certainty about the paternity of her children is likely to be enhanced by the fact that husbands often are away from home for lengthy periods of time.

The consequences of paternity designation are several. First, it influences interpersonal relationships within the household. Children are said to develop especially close ties with their "real" fathers, and siblings with the same real father and the same mother are expected to have more amicable relationships. This is particularly important for brothers who are expected to live their lives together. Second, it determines inheritance, which is calculated on a per stirpes basis. We can illustrate this system with the example of four polyandrous partitioners, three of whom are the sons of one man while the fourth is the son of his brother. With per stirpes inheritance the first three brothers "take their father's share" (which means that each receives one-sixth of the property). The fourth brother receives a full half for himself. However, partitioners may negotiate about where to begin the per stirpes accounting, and men with grown sons may use their own generation. If so, the partition will end up in an effectively per capita division of property.<sup>15</sup>

13. By 1984, 16 out of 26 (62%) of the conjoint marriages that had been contracted during recent decades—and during living individuals' lifetimes—had undergone partition. Five of those marriages had ended in widowhood without partition (see Levine 1988:174). The recent fate of the other five conjoint households (see n. 12) is unknown.

14. Accounts of Indian Himalayan polygynandry note that upon partition women similarly may designate fathers of children born into polygynandrous marriages. This is the only one of a number of reported methods, including lot, order of birth (the first child being attributed to the eldest brother, the second to the next-eldest brother, and so on), physical resemblance, and affective relationships between husbands and wives (see Berreman 1975:128–29; Parmar 1975:83). Any discussion of paternity designation in polyandry calls for reference to the classic cases of the Nayar and the Toda, on which interested readers may consult Gough (1959:26–27) and Rivers (1906:319–23).

15. Studies of traditional Tibet suggest that inheritance followed per capita reckoning and Nyinba reliance on per stirpes calculations may be due to the influence of Nepali law. Whatever the source, this practice is congruent with their emphasis on individual paternity. (On Nyinba property division, see Levine 1988:178–84.)

11. Slave marriages were traditionally monogamous and uxorilocal. Only in the past generation have the wealthier members of this population begun marrying virilocally and polyandrously—complicating comparisons with traditional landholders. In the past generation as well, the descendants of slaves have begun marrying members of traditional landholding households. (On the marriage and domestic systems of the different strata, see Levine 1988:72–74, 81–84.)

12. Among the 150 existing marriages surveyed in 1983, 9 (6%) involved simple polygyny (men married to two or more women because of infertility), 2 (1.3%) involved polyandry combined with polygyny because of infertility, and 5 (3.3%) were conjoint.

TABLE I  
Wealth of Households by Type of Household

Type of Household	Number of Households	Total Landholdings <sup>a</sup> (plow days)		Per Capita Landholdings <sup>a</sup> (plow days)	
		Mean	S.E.	Mean	S.E.
Intact	60	14.61	0.97	5.42	0.41
Conjoint	8	22.58	1.59	6.97	0.78
Partition	18	18.29	2.00	4.84	0.63

<sup>a</sup>Land per co-husband prior to partition.

## Causes of Dissolution of Polyandrous Marriages

### ESTATE SIZE

We evaluated the prediction that resource availability influences the stability of polyandrous marriages by comparing the estate size of polyandrous Nyinba households which experienced partition with the estate size of those which did not. For these analyses, we focused on land rather than other economic resources, such as opportunities in herding or trading, for several reasons. First, landholdings are relatively inelastic because good arable land is a scarce commodity in these communities. Second, Nyinba see themselves as primarily agriculturalists, with trade as highly volatile and herding too small a supplement to their income. Third, it would have been difficult to assess external economic opportunities. Finally, land inelasticity has figured prominently in theoretical models of Tibetan polyandry.

Estate size was calculated according to Nyinba reports of their holdings, which were expressed in terms of "plow days." A plow day is the amount of land that can be plowed by a yak-ox crossbreed in the course of a single day. Measurements of Nyinba fields in 1983 show a plow day to be equivalent to 0.3 acres. Nyinba further categorize their fields as highland or lowland, with lowland fields being more productive and accordingly more desirable. Levine (1988:248) has calculated that the average lowland field yields 40% more food than a highland one. Our value for landholdings was derived by multiplying lowland plow days by 1.4 and adding that value to the number of highland plow days for each household.

It is less clear, however, how men assess landholdings when contemplating partition and how best to model their evaluations. Is the dominant factor in individual men's reckoning the extent of the undivided household's estate, or is it the size of the shares they anticipate receiving after partition? The literature on Tibet speaks mostly of the importance of the family corporation and of maintaining household wealth intact from one generation to the next. But household wealth ceases

to matter once a decision to partition is reached and brothers take their personal shares to their new homes.

While individual expectations would seem to be more important than joint holdings, brothers contemplating partition often do not know exactly how much land they will receive after the household is divided. Their life-cycle stage and the outcome of negotiations that take place after partition is initiated will determine how the per stirpes division is calculated, and these negotiations can have a major impact on share sizes. The outcome may also be affected by the brothers' relationships with the common wife and the number of children each brother has produced in the existing marriage. Another possible point of uncertainty is how the brothers will align themselves after partition. For these reasons, the size of the new estates may not be known until the partition is well under way.

Therefore, in evaluating how estate size may affect decisions to partition, we decided to examine both landholdings of intact households and brothers' potential per capita shares to see if either proved a reliable predictor of partition.

In our sample, estate size varies widely. The poorest household's landholdings amounted to only 2 plow days, while the wealthiest household's landholdings were equivalent to 34 plow days. The average household's landholdings were equivalent to 16.1 plow days. There was significant variation in wealth among the intact, partitioning, and conjoint households (one-way analysis of variance:  $F_{2,83} = 4.91$ ,  $p = .0096$ ; table 1),<sup>16</sup> but the pattern of this variation was not consistent with predictions. The landholdings of households which became conjoint were significantly larger than the landholdings of households which remained intact (Scheffe test,  $p < 0.05$ ).<sup>17</sup> Although households which remained intact had somewhat less land than households which

16. One-way analysis of variance evaluates the homogeneity of values within designated samples. A significant result indicates that the variance between groups is greater than the variance within groups.

17. The Scheffe test evaluates the significance of the difference between any two groups compared in an analysis of variance.

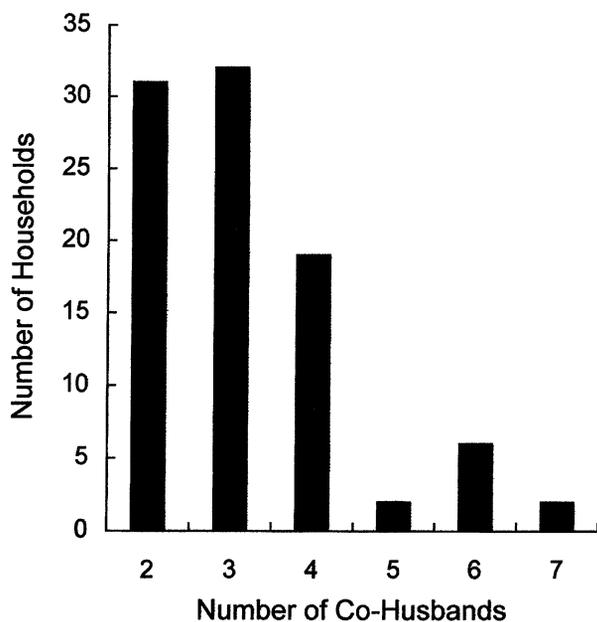


FIG. 1. Number of co-husbands per household. The average polyandrous household initially contained 3.5 co-husbands; the Nyinba consider 3 the optimal number.

partitioned, these differences are not statistically significant.

The magnitude and significance of differences in agricultural wealth among intact, conjoint, and partitioning households contract, however, when per capita landholdings are considered. Partitioning households own less land per co-husband than intact or conjoint households. Nonetheless, there was no significant relationship between per capita landholdings and household stability (one-way analysis of variance:  $F_{2,83} = 1.38$ ,  $p = 0.2567$ ; table 1).

One reason for the lack of association between estate size and partition may be economic options outside of agriculture. At the same time, land is so important to the household's economic and social standing that one would expect to find some effect, and there is none. In any event, the consequences of partition are unambiguous. Households created by partition had, on average, half the land they would have held had they remained intact (Levine 1988:253). These men, accordingly, could pass on to their sons only half the patrimony that would have been their fortune had they inherited an undivided polyandrous household.

SIZE OF THE SIBLING GROUP

In the Nyinba community, all brothers jointly marry a single woman, so the number of co-husbands initially depends upon the size of the fraternal sibling group. The typical polyandrous household in our sample began with 3.5 co-husbands ( $n = 233$  marriages), although some marriages initially included as many as 7 (fig. 1).

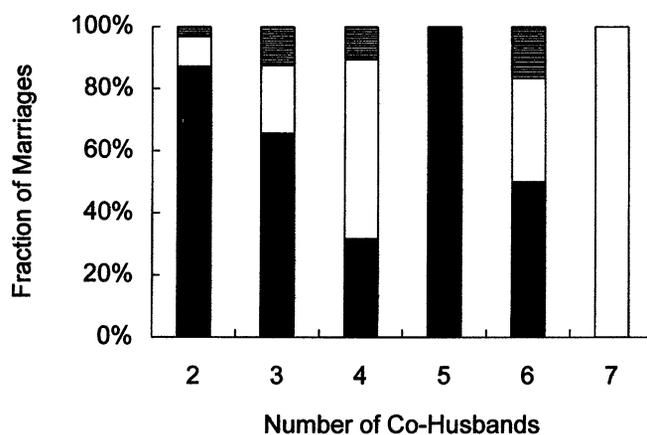


FIG. 2. Number of co-husbands by type of household. Black, polyandrous; white, partition; striped, conjoint.

TABLE 2  
Average Number of Co-husbands per Household by Type of Household

Type of Household	Number of Co-Husbands per Household		
	Number of Households	Mean	S.E.
Intact	60	2.92	0.15
Conjoint	8	3.50	0.42
Partition	25	3.88	0.27

The largest sibling groups were the least stable (fig. 2). Among marriages with two co-husbands, 10% were dissolved through partition. In contrast, 58% of marriages with four co-husbands ended in partition. There was a significant difference in the number of co-husbands among households that remained intact, became conjoint, and partitioned (one-way analysis of variance:  $F_{2,90} = 5.84$ ,  $p = 0.0041$ ). Households that partitioned included, on average, 3.9 brothers, whereas those that became conjoint included 3.5 brothers and those that remained intact included 2.9 brothers (table 2).<sup>18</sup>

DISPARITIES IN AGE AMONG HUSBANDS AND WIVES

Both sociocultural and evolutionary biological models of polyandry predict that disparities in age between hus-

18. Thus we see that the households that become conjoint are likely to include more land and more sibling co-husbands than the average polyandrous household. This may be because wealthy households have more sons to begin with and because the households with more sons are likelier to become conjoint. Given the small number of cases at hand, however, it becomes impossible to distinguish the factors that contribute to a decision for partition from those that contribute to a decision for a continuing conjoint marriage.

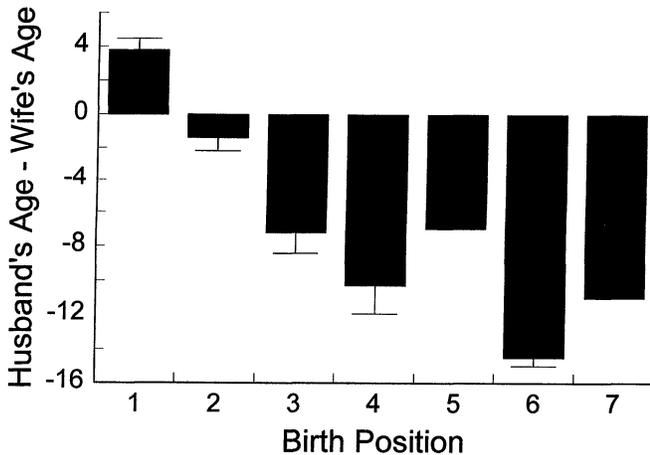


FIG. 3. Means and standard errors of age differences between husbands of different birth positions and their wives. Positive values indicate that husbands are older than their wives, while negative values indicate that husbands are younger than their wives. In most marriages, the oldest brother was older than the common wife, while men in higher birth positions were generally younger than their wives. Disparities in age among husbands and wives are most pronounced for the most junior co-husbands.

bands and wives will influence marital stability. To evaluate these predictions we will draw comparisons among three groups of men. "Polyandrous men" are those who marry polyandrously and whose marriages remain intact over time. "Active partitioners" are those who actively instigate conjoint marriages or partitions. Men who initiate conjoint marriages are combined with those who initiate partitions because both events disrupt the polyandrous marriage. Men whose marriages are altered by conjoint marriages or severed by partitions initiated by their siblings are called "passive partitioners."

In the typical polyandrous marriage, the first-born brother was 3.8 years older than the common wife, while all of the other brothers were younger than the common wife (fig. 3). This means that birth order is significantly related to the disparity in age between a man and his wife (Pearson correlation coefficient:  $r = -0.5919$ ,  $p < 0.001$ ,  $n = 199$ ). For men born late in the birth order, the disparity in age can be substantial. The two sixth-born brothers were 14 and 15 years younger than their wives.

The disparity in age between men and their wives is significantly related to the role that men play in their marriages (one-way analysis of variance:  $F_{2,199} = 7.31$ ,  $p = 0.0009$ ; fig. 4). Active partitioners are significantly younger vis-à-vis their wives than their co-husbands (Scheffe test,  $p < 0.05$ ). In our sample, 27% of the men who were younger than the common wife became active partitioners, while only 9% of the men who were

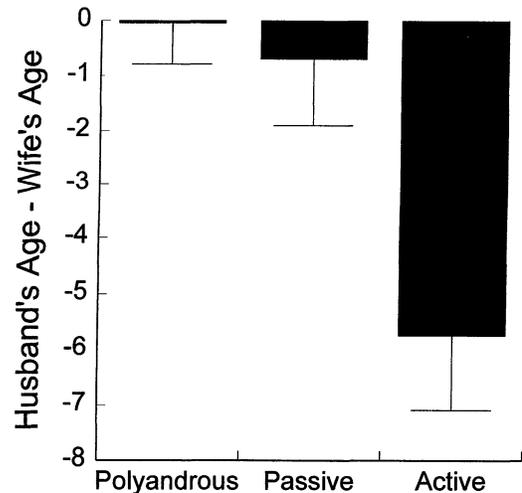


FIG. 4. Means and standard errors of age differences between husbands and wives for men in stable polyandrous marriages, passive partitioners, and active partitioners. Active partitioners are most junior to their wives.

older than their common wife did so. Active partitioners were nearly six years younger than their wives on average, while their co-husbands were about one year younger than their wives. Men who remained in stable polyandrous marriages were approximately the same age as their wives.

It should be noted that the wives of men who contracted conjoint marriages or partitioned were not elderly, even though they were usually older than their husbands. The sample included 23 wives of known age whose marriages were terminated by conjoint marriages or partitions. These women's ages ranged from 19 to 69 years, but the average age was 34.9 years. Ten of the 23 women (43%) were no more than 30 years old at the time of partition.

Since birth order and disparities in husbands' and wives' ages are associated, it is not surprising that birth order is also a good predictor of the role that men play in partition events. First-born brothers initiated only 7% of all conjoint marriages and partitions, while second-born brothers initiated 22% and men born later in the birth order initiated 37–39%. There was significant variation in the birth positions of polyandrous men, passive partitioners, and active partitioners (one-way analysis of variance:  $F_{2,230} = 3.95$ ,  $p = 0.0206$ ; table 3).

When men contract new marriages, they nearly always marry women who are younger than their first wife (35/39 = 90%; sign test:  $z = 4.80$ ,  $p < 0.001$ ). Among the men who initiated conjoint marriages or partitions, 82% were younger than their first wife, while only 33% were younger than their new wife. These active partitioners left first wives who were, on average, 5.7 years older and married second wives who were 3.6 years younger than themselves.

TABLE 3  
*Birth Position and Marital Status*

Marital Status	Birth Position		
	Number of Men	Mean	S.E.
Intact	135	2.05	0.13
Passive partitioner	50	2.02	0.17
Active partitioner	48	2.69	0.18

REPRODUCTIVE SUCCESS

To examine the effect of reproductive success upon men's decisions to remain in polyandrous unions, we have drawn upon cross-sectional census data collected by Levine in 1982-83. These data provide information about men's ages, marital status, and reproductive histories. The techniques used to obtain and verify information about children's paternity rely on local attributions and are described in appendix A. To account for the fact that some men were married longer than others and the fact that some men matured after they were married, some of the analyses of reproductive success that follow are based upon the number of children produced per year of marriage for men aged 18 and over.

It is almost inevitable that at the outset of the marriage the eldest brother will have a certain advantage. In some cases it is he who selects the wife and brings her home; in arranged marriages he is apt to be the one who first initiates a sexual relationship with her. In fact, the eldest brother is most likely to be considered the genitor of the first child born in the marriage: 67% of first-born children surviving at the time of the survey were considered the offspring of the eldest (table 4). This advantage declines to some extent with subsequent births, and the second birth is most likely to be attributed to the second-eldest brother in the marriage. However, disparities in individual reproductive success among co-husbands are not completely eliminated over the course of men's lives. Birth order is negatively related to the number of children produced during their marriages for men who remain in stable polyandrous marriages ( $r = -0.2740, p = 0.028, n = 67$ ) and to the number of children produced per year of marriage ( $r = -0.2355, p = 0.028, n = 67$ ).

In households that became conjoint or partitioned, the most senior co-husbands had produced more children than their younger co-husbands before the marriage was terminated. In these households, birth position is negatively related to the number of children sired during the original polyandrous marriage ( $r = -0.3810, p = 0.001, n = 70$ ) and to the number of children sired per year of marriage ( $r = -0.3668, p = 0.001, n = 70$ ).

Reproductive success is, moreover, associated with

TABLE 4  
*Birth Positions of Co-husbands and Paternity*

Birth Position of Child <sup>a</sup>	Birth Position of Co-husband					
	1		2		>2	
	Number of Children	%	Number of Children	%	Number of Children	%
1	43	67	16	25	5	8
2	22	39	29	51	6	11
3	20	39	21	41	10	20
4	19	45	18	43	5	12
5	12	39	13	42	6	20
6	11	50	5	23	6	27
7	6	38	5	31	5	31
8	3	25	6	50	3	25
Total	135	46	113	38	46	16

<sup>a</sup>Children surviving at the time of the survey.

the roles that men played in their marriages. While men who remained in polyandrous marriages produced, on average, 1.8 children over the course of their married lives, passive partitioners produced 1.1 children and active partitioners produced 0.5 children during their original marriages (one-way analysis of variance:  $F_{2,134} = 10.8964, p < 0.0001$ ; table 5). These figures do not take into account the fact that men who remained in polyandrous marriages had longer marriages—and thus more opportunities to produce children—than men whose marriages were terminated. Significant differences in individual reproductive success persist when this factor is taken into account (one-way analysis of variance:  $F_{2,134} = 4.3328, p = 0.0150$ ; fig. 5). While polyandrous men and passive partitioners had produced, on average, 0.10-0.11 children per year of marriage, the active partitioners had produced only 0.04 children per year of marriage.

The low reproductive success of active partitioners is

TABLE 5  
*Reproductive Success of Co-husbands in Original Marriages*

Marital Status	Number of Men	Total Number of Children Sired		Number of Children Sired per Year	
		Mean	S.E.	Mean	S.E.
Intact	67	1.78	.20	.11	.01
Passive partitioner	39	1.08	.17	.10	.02
Active partitioner	31	.45	.14	.04	.01

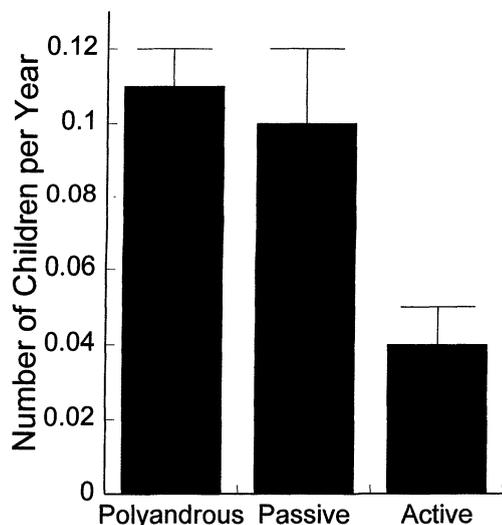


FIG. 5. Means and standard errors of number of children produced per year of marriage by polyandrous men, passive partitioners, and active partitioners. Active partitioners produced substantially fewer offspring per year of marriage during their initial marriages than other men.

apparently not the result of their own infertility. If that were the case, we would expect little change in their reproductive rates after active partitioners remarried. In fact, these rates significantly increased after remarriage ( $t = 2.88$ , d.f. = 29,  $p = 0.007$ ). If active partitioners had been less fertile than their co-husbands, we also would expect the same disparities in reproductive success between active and passive partitioners before and after they remarried. However, men who were active partitioners displayed reproductive rates in their new marriages three times those of men who were passive partitioners (one-way analysis of variance:  $F_{1,67} = 5.9420$ ,  $p = 0.0174$ ).

#### KINSHIP AMONG CO-HUSBANDS

To test the prediction that the degree of relatedness among co-husbands will influence the stability of polyandrous marriages, we compared the average degree of relatedness among co-husbands in households that remained intact, became conjoint, and partitioned. Our sample included the men of 57 households. The procedure for estimating the relatedness among co-husbands is detailed in appendix B. To obtain the average degree of relatedness within each group of polyandrously married men, we summed the coefficients of relatedness for each pair of co-husbands and divided the total by the number of pairs of co-husbands in the marriage. As we noted earlier, data on relatedness derive from local attributions (see appendix A).

The estimates of the average degree of relatedness among co-husbands in households ranged from 0.09 to

TABLE 6  
Average Degree of Relatedness within Households

Type of Household	Average Degree of Relatedness		
	Number of Households	Mean	S.E.
Intact	29	0.37	0.02
Conjoint	7	0.39	0.02
Partition	21	0.37	0.04

0.50. The average value was 0.36, halfway between the values for full siblings and half-siblings. There was no consistent relationship between the number of co-husbands in households and their average degree of relatedness to one another (Pearson correlation coefficient:  $r = 0.0297$ ,  $p = 0.413$ ,  $n = 57$ ).

The average degree of relatedness among co-husbands did not vary significantly between households that remained polyandrous, became conjoint, or partitioned (one-way analysis of variance:  $F_{2,54} = 0.0918$ ,  $p = 0.9124$ ; table 6). Thus the degree of relatedness among co-husbands did not seem to influence the stability of their marriages.<sup>19</sup>

It is possible that men might have taken advantage of partition or conjoint marriage to increase the relatedness between themselves and their co-husbands. To determine whether realignment consistently altered the average degree of relatedness among co-husbands, we compared the composition of 27 sibling groups before and after partition. In 12 cases, no changes in the average degree of relatedness among co-husbands were possible because there were only two co-husbands in the marriage (3 cases) or all co-husbands had the same degree of relatedness to one another (9 cases). In the remaining 15 households, men could have altered the degree of relatedness to their co-husbands when they realigned themselves in new marriages. In 5 of these households, men formed 2 new polyandrous marriages. In the remaining 10 households, one co-husband married monogamously while the others married polyandrously. Thus, 20 new polyandrous marriages were formed. In 11 of these new marriages, the average degree of relatedness among co-husbands was higher than the average degree of relatedness among co-husbands in the original marriage; in 8 cases the pattern was reversed, and in 1 case there was no change. Thus, there is no consistent tendency for men to increase or decrease

19. Nyinba state that having different parentage has a negative impact on fraternal relationships, and the offspring of conjoint marriages do seem more likely to contract conjoint marriages themselves (see Levine 1988:154). Some such unions, however, are sustained for the life of the partners, that is, they do not necessarily result in partition (see n. 13).

their relatedness to their co-husbands when they realign themselves in new polyandrous marriages.

## Discussion

We have reviewed a range of models of polyandrous systems deriving from the paradigms of sociocultural anthropology and evolutionary biology and tested hypotheses about factors influencing the stability of polyandrous marriages. These findings have substantiated some of the common presumptions about polyandrous systems and called others into question. Although it is hazardous to generalize from correlations to the causes of behavior, our results do allow us to make several cautious observations about factors that contribute to the stability of polyandrous marriages—for Nyinba landholders at least.

First, the Nyinba data do not support the common argument that polyandry is maintained by economic and ecological factors that constrain men's ability to support their families. The total and per capita landholdings of intact households are approximately the same as the landholdings of households that partitioned, contradicting the notion that men leave polyandrous marriages whenever they can afford to do so. Men with the largest estates in our sample contracted conjoint marriages but did not partition. Moreover, poor men did not necessarily remain in polyandrous marriages.<sup>20</sup>

This finding, however, does not refute hypotheses that polyandry *originated* under conditions of severe resource constraints in the unrecorded past, nor does the Nyinba case contribute to our understanding of how modernization and changes in subsistence strategies may undermine commitments to polyandry. Reports on traditional Tibet have suggested that polyandry predominated among landed agriculturalists and was less common among pastoral nomads and traders (Aziz 1978:157–58). Recent studies of indigenous ethnic Tibetan communities in India and Nepal have described a sharp decline in polyandry following economic changes and fuller incorporation into the modern world economy. In Limi, for example, men began leaving their polyandrous marriages after the community shifted from dependence on agriculture to major involvement in long-distance trade and an expansion of herding (Goldstein 1978:331–32). Urban development near the

capital of Ladakh and the availability of new job opportunities were followed by a similarly dramatic decline in polyandrous marriages (Crook and Crook 1988:105), although the government-instituted proscription on polyandrous marriage may have played a role in this decline as well.

The abandonment of polyandry under such circumstances may reflect processes of adjustment between systems for organizing labor and forms of marriage, as studies of polygyny suggest (Boserup 1970, Goody 1976). Goody has argued that traditional Tibetan polyandry is most appropriately viewed as a special form of household organization that enhances viability under conditions of high demand for male labor while preventing the diminution of property and status (1990: 139, 153). This view fails to explain why a system relying so heavily on male labor developed in the first place. It also leaves unresolved long-standing questions about the role of economic and environmental factors in the development of polyandrous institutions.

Four factors were consistently associated with the stability of Nyinba polyandrous households: (1) the size of the sibling group, (2) the magnitude of disparities in age among husbands and wives, (3) birth position, and (4) the number of children that men fathered. All these factors are closely correlated. It would be ideal to subdivide the sample and examine the effects of each variable separately. However, the numbers of households and individuals in our sample are too small and the factors are too closely related to make this a practical option. Nonetheless, we can make some reasonable deductions about the relative importance of these factors in men's decisions to partition.

There are several reasons that the number of co-husbands might influence the stability of polyandrous marriages. First, it is possible that large sibling groups are unstable simply because of their size. The Nyinba believe that trifraternal polyandry is highly desirable and that larger marital unions are problematic because they are prone to discord. If each pair of co-husbands must establish and maintain a cooperative, cordial, or at least tolerant relationship in order to sustain the marriage, then it is easy to see why the number of co-husbands might influence marital stability. Second, following evolutionary biological predictions, larger sibling groups might be undesirable because they impose greater limits upon men's reproductive opportunities (Beall and Goldstein 1981:9; Crook and Crook 1988: 108). Third, following sociocultural predictions, sexual jealousy might intensify as more men share sexual access to a single wife.

However, if the size of the sibling group were the only factor influencing men's decisions to dissolve their marriages, then all co-husbands in large sibling groups should be equally likely to initiate partitions. Instead, the men who take the initiative in contracting conjoint marriages and partitions are consistently those who are most junior to their wives and co-husbands and least successful in producing children of their own.

20. While these analyses show no consistent relationship between landholdings per se and the rate of partitions, there are a number of related circumstances whose effects we have not been able to test. One concerns the rare occasions in which landed households acquire second estates from families without heirs. Such households do seem likelier to partition, but the reasons seem more complex than ownership of large parcels of land (see Levine 1988:247, 251). Another involves households in new hamlets, which have ready access to new lands and are likelier to undergo partition. However, the majority of such households are descended from slaves, who, as we have seen (n. 11), were customarily monogamous (see Levine 1988:276).

The dissatisfaction of the most junior brothers with their marriages may be related to their subordinate status within the household. In Tibetan households, the eldest brother has greater authority and may take advantage of his position to delegate unpleasant work to his junior siblings or sexually monopolize the common wife. It is plausible that strong-willed younger siblings resent this. While we lack the necessary data to examine the subjective experiences of polyandrous men, the high stability of bifraternal polyandrous marriages suggests that such feelings are not prominent in small sibling groups. It is possible, however, that a man's standing in his family declines a notch with each move higher in the birth order and that any disadvantages associated with holding junior status would increase correspondingly.

Birth order is also correlated with the magnitude of age differences among husbands and wives. When brothers marry, their common wife is typically somewhat younger than the oldest brother but older than the other brothers. The largest disparities in age among husbands and wives are found in the largest sibling groups, making it difficult to assess the relative importance of these two factors in men's dissatisfaction with their marriages. There are several reasons, however, that we might suspect that disparities in age among husbands and wives influence decisions to partition. First, as sociocultural anthropologists and evolutionary psychologists have suggested, young men married to older women may find them less satisfactory companions, less attractive physically, and less satisfying sexually. Moreover, men's reproductive prospects are enhanced by marriage to a younger woman. There is some reason to believe that Nyinba men do prefer younger women as wives. When men remarry, disparities in age among husbands and wives are generally reduced or eliminated. Virtually all men married women who were younger than their first wives, and two-thirds of the men married women who were younger than themselves. Although it is plausible that men initiate joint marriages and partitions because they are dissatisfied with much older wives, we have no direct evidence that men are dissatisfied with their wives or have not established satisfactory sexual and personal relationships with them; moreover, the fact that partitioners marry younger women may simply reflect the fact that more young women are available for marriage.<sup>21</sup>

In addition to being junior to their co-husbands and much younger than their wives, men who initiate joint marriages and partitions have generally been un-

successful in fathering children. The average active partitioner is 29 years old and is married to a 34-year-old woman. He has produced half as many children per year of marriage as his co-husbands. These men are capable of fathering children and have successful reproductive careers when they remarry. Thus, active partitioners are old enough to have produced several children already, they are physically capable of producing children, and their wives were generally young enough to have borne them children. What accounts for their poor reproductive performance?

One possibility is that these men were denied equal access to the common wife by their brothers. From both an evolutionary and a sociocultural perspective, such competition might be expected. Crook and Crook (1988:110) point out that the "reproductive advantage of the older brother can be increased by the elimination from co-husbandry of the brother nearest to him in age." They suggest that this may be the reason that second-born brothers predominate among monks in two Zanskari monasteries (p. 110, citing Crook and Shakya 1988).<sup>22</sup> Among Nyinba, sexual exclusivity is strongly disapproved (see Levine 1988:164–65). If so, contraventions of the norm may be particularly galling to an excluded brother and serve to justify partition.

A second possibility is that the low reproductive success of active partitioners is a consequence of a decision to partition rather than its cause. That is, active partitioners may limit their own reproductive activities as a deliberate strategy to facilitate their later separation from the family. Nyinba say that men whose marriages have broken down and who are planning partition purposely avoid sexual relations with the common wife. Any partitioner who has had such a relationship is penalized; he is said to have spurned the common wife and is obliged to compensate her with part of his share of the household's heirloom jewelry. More problematic, a man who fathers one or more sons by the common wife and fails to take them with him is obliged to leave a part of his property share behind for them. A third possibility is that the common wife is trying to precipitate partition by avoiding sexual relations with a husband she does not like. However, Nyinba women do their best to retain all their husbands in order to maintain their households' wealth and have it passed on intact to their children.

While such strategies may contribute to the markedly low reproductive success of active partitioners, other factors clearly are at work. Even in stable polyandrous households, younger brothers fail to reproduce as successfully as their older siblings. Birth position is negatively related to the total number of children produced during the marriage and to the number of children produced per year of marriage. Of course it is possible that

21. Nyinba men seek young unmarried women for a number of reasons. Disentangling a childless woman from her marriage involves heavy compensation payments and often embroils the pair in long-lived disputes with the former husband and his allies. Married women with children almost never leave their husbands, and widowed women with children always stay with those children in their natal home. Unmarried women in their twenties and above are known by the unflattering term "left over" and tend to be in this situation because of perceived personal flaws.

22. In Indian polygynandry, such problems are resolved by incorporating additional wives into the household, which mitigates disadvantages experienced by younger brothers.

this negative correlation is created by men who are planning to terminate their marriages but have not yet done so. However, the third- and fourth-born brothers, who suffered the greatest reproductive decrements in polyandrous households, had been married 19 years on average.

The degree of relatedness did not have any consistent influence upon the stability of polyandrous men's marriages, and when men formed new polyandrous marriages after partition they did not consistently increase their degree of relatedness to their co-husbands. These data are somewhat surprising in view of the fact that the Nyinba suggest that the most stable marriages involve groups of men who are closely related to one another and the fact that kinship is associated with polyandry in other animal species. Evolutionary psychologists might argue that this result is due to the fact that polyandry is a recent innovation in human societies and our evolved psychology is not designed for such situations.

In summary, we conjecture that Nyinba men's decisions to leave their marriages are mainly influenced by their disadvantages within the sibling group and their relationships with much older wives, which reduce their chances of reproducing successfully within the polyandrous marriage. The importance of these factors is underscored by the fact that when men remarry, they remedy these circumstances by marrying women younger than their first wives and by siring more children than they had in their first marriages.

The associations we have established contravene certain predictions drawn from evolutionary and sociocultural theories of human behavior while supporting others. Our findings suggest that the most important factor prompting marital dissolutions is the reproductive disadvantages experienced by younger men, often in the larger sibling groups. While the argument that restricted reproductive opportunities contribute to polyandrous marital breakdowns is consistent with the predictions of evolutionary theory, it is not prominent in sociocultural theory.<sup>23</sup> Nyinba culture and ideas about kinship, however, stress such expectations, and many sociocultural anthropologists would agree that emic evaluative criteria of these kinds can influence men's assessments of the satisfactions of their marriages and their willingness to continue them. Such decisions, moreover, are not made in a vacuum. Each man may have to decide individually about his marriage, but others may influence this decision. Men's wives, siblings, and parents, as well as friends, may be deeply concerned about and try to play a role in their marital decisions.

Sociocultural theory suggests that Nyinba views about the importance of having "own" children may be culturally idiosyncratic. Certainly we read little about

this subject in the published literature on other polyandrous societies. The cross-cultural literature also reveals marked variations in the way genealogical kinship is understood and how its importance is assessed (see Schneider 1984). Many societies play down the genealogical aspects of paternity, the most notable examples being in Oceania.<sup>24</sup> This is one example of the great cross-cultural diversity in behavioral obligations among kin.

As our study has shown, sociocultural and evolutionary theories may complement one another in testing hypotheses about human behavior. The two bodies of theory are concerned with different levels of explanation, sociocultural theory with the proximate and evolutionary theory with the ultimate factors that shape human behavior. For most sociocultural anthropologists, human behavior is culturally conditioned and emphasis is placed on the plasticity of culture. Beyond this, the field subdivides. Some sociocultural anthropologists see culture as autonomous and not necessarily adapted to the material conditions of existence. Others treat culture as constrained by features of the political and economic environment or other features of the sociocultural system.

Recently, however, moves have been made to bridge the sociocultural and evolutionary divide. Many biological anthropologists have become sensitive to the ways in which social and cultural systems shape mating and parenting behavior, while certain sociocultural anthropologists have begun to test evolutionary predictions (see, e.g., Betzig, Borgerhoff Mulder, and Turke 1988, Hewlett 1992). It may be that a meaningful synthesis—which encompasses presumptions about the power of culture, the forces of chance in cultural history, and presumptions about how natural selection has favored behaviors that enhance reproductive success—will prove elusive. Nonetheless, a fruitful discourse between the two paradigms has begun; it undoubtedly will continue and may enhance our understanding of human behavior.

## Appendix A: Sources of Data

The data cited in this paper derive from different strategies of data collection carried out at different times, which can be subdivided as follows:

1. *Marriage, landholdings, and fertility.* These data derive from a structured questionnaire and census administered in 1982–83 to every household in two Nyinba villages and a random sample of households in two other villages (which were difficult of access). Members of 126 out of 184 Nyinba households completed the questionnaire; another 4 interviews were incomplete.

23. In his classic article on polyandry and the definition of marriage, Leach speaks of the rights of establishing legal parenthood over a spouse's children and monopoly over a spouse's sexuality but not rights for reproductive purposes per se (1966 [1955]:107).

24. By this we mean the classic cases of the Trobriands and aboriginal Australians, whose members reportedly did not acknowledge men's biological roles in reproduction (see Weiner 1992:73–75).

2. *Partition.* These data were collected in the course of unstructured participant observation and semistructured interviews during 1973–75 and 1982–83. This included interviewing at least one participant from every partition known to have occurred during the preceding 25 years about the causes of the breakup, how the family was subdivided, and the property share each man received.

3. *Paternity.* Attributions of paternity were collected in 1982–83 for all children in three of the four Nyinba villages. Because paternity can be a sensitive matter, some of these questions had to be referred to close relatives outside the household. These data were cross-checked against genealogies and partition histories in which paternity affected property divisions. These attributions may not be empirically accurate but do reflect local ideas.

4. *Genealogical materials.* These were sought from one member of every Nyinba household, gradually, over the course of the two field studies. Because people typically specify the parentage of children born of complex polyandrous-polygynous unions in genealogies, they were used to validate the data on paternity.

## Appendix B: Procedure for Computing Relatedness among Co-husbands

The degree of relatedness ( $r$ ) between two individuals is defined as the probability that two individuals carry copies of the same gene through descent from a common ancestor. This is, in turn, a function of the number of common ancestors two individuals have and the number of generations that they are displaced from their common ancestor(s). The relatedness among parents and offspring is 0.5. Siblings are related by 0.25 through their mothers and/or 0.25 through their fathers. When siblings have the same mother and the same father, these components are summed to equal 0.5.

Computations of degrees of relatedness among the Nyinba are complicated by the complexity of polyandrous marital arrangements. In general, related men are married jointly to a single woman. There are also cases, however, in which groups of men marry more than once, unrelated men marry jointly, children are fathered illegitimately, and so on. This means that the degree of relatedness among children in the same household may theoretically vary from 0 to 0.5. Although these computations are tedious, they do not present significant technical obstacles when genealogies are complete. However, a major practical difficulty arises for children who are sired by related men whose genetic relationship to each other is not known precisely.

There are several different ways to resolve this problem. One would be to exclude all pairs of siblings for which genealogical data were incomplete. Unfortunately, this would restrict our data to households for which we had complete information over many genera-

tions, a severe constraint. The second would be to compute two parallel estimates, one based upon a minimum estimate of relatedness between men and the other based upon the maximum estimate. The true figure would be assumed to lie somewhere in between. The problem with this method is that the range between these values is broad, and it does not incorporate what we know about mating patterns within the population. The third approach, which is the one taken here, is to generate an estimate of the average degree of relatedness within the population and use this unbiased estimate to compute relatedness when information is incomplete.

We attempted to estimate the average degree of relatedness within the population as follows: We tabulated the number of pairs of children in the same household who were known to have the same father, the same mother, different fathers, and different mothers. Information about 386 pairs of children in polyandrous households was available. There were 192 pairs of siblings with the same mother and same father, 38 pairs with the same father and different mothers, 129 pairs with the same mother and different fathers, and 27 pairs with different mothers and different fathers. These values were used to compute the proportion of pairs of children in the same cohort that were full siblings, paternal half-siblings, maternal half-siblings, or unrelated. Each of these proportions was multiplied by the appropriate degree of relatedness to obtain the expected degree of relatedness between any given pair of children in the same household. Thus,  $(192/386) \times 0.5 + (38/386) \times 0.25 + (129/386) \times 0.25 = 0.3569$ . This figure is an estimate of the expected degree of relatedness between any pair of children raised in the same household. The estimate underestimates relatedness to some extent because it does not allow for the fact that the fathers of children with different fathers may have been related. We are unable to rectify this omission because this is the value that we are trying to estimate. Any method that relies upon incomplete genealogies must make some assumption about relatedness in the most distal generation for which information is available.

## Comments

M. BORGERHOFF MULDER AND K. A. HADDIX  
*Department of Anthropology, University of California at Davis, Davis, Calif. 95616, U.S.A. 13 x 96*

Levine and Silk conclude with a brief discussion of the compatibility between evolutionary (by which they mean behavioral ecological) and sociocultural perspectives within anthropology, and their paper demonstrates the fruits of such collaboration. Using insights from both perspectives, they make some simple predictions of when polyandrous households might split, shedding direct light on the instabilities within polyan-

drous marriage among the Nyinba. What can we, as evolutionary anthropologists, say more generally about polyandry on the basis of this study?

The results of these analyses suggest that the evolutionary biologists' model for polyandry in humans has not been well specified. The hypothesis, first proposed by Alexander and elaborated on by Goldstein and Crook, is that a group of brothers will share paternity whenever economic and demographic circumstances limit the ability of each to support a monogamous family of his own. If this hypothesis were correct we would, amongst other things, expect (a) polyandrous households to have smaller estates than nonpolyandrous households and (b) partitioning polyandrous households to have larger estates than nonpartitioning polyandrous households. Neither of these hypotheses is supported.

Levine and Silk do not seem to appreciate the significance of the refutation of this widely cited model for polyandry. Instead, they focus on the evidence for sexual jealousy among the Nyinba and note *its* congruence with evolutionary predictions. While we agree that this finding is very interesting, wasn't the original hypothesis that men would be willing to share paternity when resources were stressed? The refutation of this long-standing hypothesis warrants more thorough analysis and discussion. We need a multivariate model that looks at the risk of a marriage's partitioning (or, indeed, becoming polyandrous) with respect to the *interaction* between the availability of resources and a set of variables indicative of potential sexual jealousy (birth order, sibset size, and spousal age differences). Logistic regression, ideally with time-varying covariates, is the appropriate statistical procedure for testing a model developed along these lines, since it is designed to analyze a dichotomous outcome such as "partition" versus "don't partition" or "join your brothers" versus "don't join your brothers."

In addition, estate size is only one way of measuring resource availability. Though Levine and Silk recognize this point, they do not pursue it. Himalayan households produce wealth not only through agriculture but through the herding of domestic stock and investments in long-distance trade. Depending on the extent to which a household's economic activities are diversified, labour, particularly male labour, may be limiting. While one set of brothers may inherit a large herd of pack animals suitable for large-scale involvement in long-distance trade, allowing that household to exploit trade and agricultural opportunities, another set of brothers may inherit few animals and instead concentrate its economic activity upon agriculture. Thus, though all households theoretically have equal access to each of the economic spheres in this tripartite economy, some households in fact require more males of working age than others. Therefore we suggest that two further measures be introduced into the multivariate analysis—the number of men of working age and some ranking of household economic diversification.

We are very sympathetic to Levine and Silk's comments about being unable to conduct more complex sta-

tistical analyses of these data because of the small sample size. We also appreciate the difficulty in collecting a data set of this quality. In addition, we strongly support collaborative work between evolutionary biologists and sociocultural anthropologists. We therefore raise these issues to point out that researchers in the future will need larger samples or stratified sampling techniques in order to make more precise tests of the current behavioural ecological model for the distribution of polyandry in human societies. In our opinion Levine and Silk's study, along with Durham's (1991) analysis, stands as the best test to date.

RAMESH CHANDRA

*Anthropological Survey of India, Udaipur 313001, India.* 13 XII 96

Levine and Silk are to be congratulated for opening a new vista in research on polyandry, which has previously been studied in terms of what it is, where it is, how it functions, and what factors accentuate it. Postulating "sources of instability in polyandrous marriages," prefixed by "why polyandry fails," seems a half-baked approach to polyandry as having socio-ritual and physical components (sexuality and the siring of children) that undermine the process of evolution of human marriage (entailing both components). Given that polyandry has a long history in a number of different societies around the world—the Paiute and Shoshone in North America and others in Australia, Africa, and Asia (Sri Lanka, Tibet, India)—the notion that it "fails" needs rethinking. As is evident from Indian Himalayan societies, among others, and in the light of the explanations of the evolution of human marriage of McLennan, Spencer, and Westermarck (see Chandra 1992:154–59), which stress the dynamic nature of human societies and humans' capacity for manipulations to suit their requirements, it seems inappropriate to describe social reality as "failing" rather than "changing." There are differences, after all, between decay and transformation. Levine and Silk's hypothesis that age disparity among co-husbands results in disadvantages in sharing the wife's sexuality and in turn diminishes chances of siring children needs to be substantiated with a set of diachronic data from different societies reported as polyandrous rather than merely a few synchronic data from a single society—even one in which polyandry is normative such as the Nyinba—especially when the patterns emerging from the study are somewhat similar to those produced by earlier studies. In explaining polyandry the authors themselves seem to waver, for internal contradictions appear with regard to the role of societal profile and economic and ecological factors and the limited generalizability of results based on so small a sample.

I wish that Levine and Silk had recognized the authenticity of the sacredness of the institution of marriage, of which, at least in the Eastern context, polyandry is only a derivative. The socio-ritual aspect

predominates over the sexual aspect of marriage. Even today, Indian Himalayan polyandrous societies depend on the kinship bond in polyandrous families to keep the economy intact at the sibling level. Whatever maladjustments there may be over the sharing of the common wife's sexuality or her wifehood are minimized in the interest of the success of the polyandrous union necessary for survival under harsh environmental conditions (fraternal polyandrous societies are mostly found at altitudes of 2,000 m and above), despite the social change associated with development efforts and a shift in the economy from kind to cash, which is reorienting minds from collectivism to individualism and introducing the notion of a joint venture at the sibling level and relations between spouses devoid of compulsory sharing (Prasanna et al. 1996). Changing scenarios of human action resulting in dents here and there in social arrangements may too quickly be identified as "weakness" and "failure" of the system. Even with monogamy, often considered the ultimate marriage form, concepts such as living together without marriage and unwed mothers have crept in to stay. Does this mean that monogamy is failing? It is, however, reasonable to suggest that as changing conditions make life easier people may abandon polyandry over time in the course of the evolution of human marriage, as there are still societies with some distinct ethos about this. One needs to examine the data and their interconnections within their context rather than in isolation.

Levine and Silk have analyzed the decline in number of co-husbands from many to two, but in all such cases polyandry strictly speaking prevails. The three sources of instability they identify stress sexuality and procreation at the expense of the sociocultural legitimation and ritual attached to acquiring the status of husband/wife and married person and the ecological/environmental conditions that operate as causes. Paradoxically, the sexual aspect is emphasized primarily when the authors seem uncomfortable about polyandry as such. The Nyinba's disapproval of exclusive rights over the common wife's sexuality repudiates these conjectures. The idea of compensation to the common wife on deserting the polyandrous union after fathering a child clearly favors the maintenance of polyandry rather than the reverse. Perhaps for want of clarity on a man's moving from one polyandrous union to another or to a monogamous one, no conclusions are drawn singling out sources of instability. Therefore the results at best provide suggestions for further research employing the sociocultural and evolutionary approach for which the authors undoubtedly deserve kudos.

JOHN H. CROOK

*Winterhead Hill Farm, Shipham, North Somerset*  
BS25 1RS, U.K. 29 XI 96

I greatly welcome this contribution to the analysis of polyandrous behaviour in the Himalayas and Tibet. At last we have a friendly dialogue between theoretical positions arising from sociocultural and evolutionary ap-

proaches. The bipartisan approach adopted here goes far beyond the disputations between adherents of these approaches that have been all too prominent in recent years and moves us on to a promising discourse between the two. The value of this approach is clearly revealed by the fact that the two perspectives can now be seen to support one another in the examination of the cultural and the demographic aspects of village life and enable us to test overlapping hypotheses in a highly creative manner.

Levine and Silk point out that it is difficult to establish a consistent connection between specific economic, ecological, or demographic variables and the occurrence of contrasting marital forms in the Himalayas. This should not surprise us. The marital outcomes are clearly due to the systemic interaction of several such factors and, in addition, cultural constraints such as the presence or absence of large monasteries and ideological contrasts.

To determine both the proximate sources of stressors determining marital practice and an estimation of behavioural effects on reproductive fitness, large and effective data bases are required. So far only a limited number of these are available, but a comparative survey across the trans-Himalayan region suggests that modelling of local variation using common parameters may soon become possible, elucidating the systemic processes generally at work (Crook 1995). Future work will require that the materials be collected in similar ways. Each research location needs to be subjected to questioning in common, and for this to be productive the data must be in a comparable format. Research collaboration will be the order of the day. Contrasts between Ladakh, Humla, Dolpo, Mustang, and Manang are likely to be especially valuable because of the ecological and cultural differences between these places.

The factors determining the occurrence of polyandry become particularly visible when cultural and demographic parameters are on the move. A recent review has therefore attempted a preliminary analysis treating not only comparisons between locations but also comparisons through time (Crook 1996). Data collected at one time should be clearly comparable with data collected after a period of years. The common ethnographic practice of disguising names is called into question here, because accurate statements of place and household location will be essential. Data collection in this research project needs to be as exactly numerical as is the rule in analyses of social life in animal populations and conducted in such a way as to be repeatable by others in later years. Levine and Silk have set an excellent example.

MILDRED DICKEMANN

*2901 Humphrey Ave., Richmond, Calif. 94804, U.S.A.*  
10 XII 96

This article is an interesting attempt to address the "puzzle" of polyandry, entering, so to speak, by the back door because the front door has up to now been

unbreachable. However, in regard to the fundamental Darwinian proposition that human behaviors are generally adaptive in terms of reproductive success, the means of measurement is critical. I think it can be said that there is, as yet, no adequate measure of the relative reproductive success of polyandry. The studies included here measure "surviving offspring," but numbers of surviving births may be an inadequate representation of reproductive gain. First, humans may achieve short-term reproductive gains through large numbers of offspring or long-term gains through the longevity and quality of fewer descendants through several generations, depending on circumstances. In the latter case, first-generation numbers are not an adequate reflection of long-term reproductive success. (This point is also made by Fernandez [1981] in her critique of Beall and Goldstein [1981].) Secondly, in kin societies with coercive parental control of offspring decisions, the reproductive acts of individuals in early adulthood may accrue to the reproductive benefit of parents rather than of the offspring themselves. In this case, greater generational depth is required for a realistic reproductive-success assessment. Thirdly, where such parental control exists, reproductive-success measures must include gains through female as well as male offspring.

Only Crook and Crook (1988) attempt to address this aspect, though with reservations, employing a limited set of genealogies collected by Prince Peter and updated and computing the reproductive success of *grandmothers* resulting from their children's marriages. One result is the "slightly higher average grandmaternal fitness" of women who had married polyandrously (pp. 107–8).

Part of our problem in understanding fitness is our too-easy acceptance of the dominant kin ideology of such patrilineal societies, namely, that descent through males is the primary route to success. This may be fallacious. In hypergynous dowry societies (Dickemann 1979a,b, 1981), families strive at great economic cost to place daughters in marriages of equal or higher status. A similar effort, less overtly acknowledged in official ideology than the passage of land to male heirs, may be operating here. The general theoretical problem of reproductive-success measurement remains a sticking point in human studies. However, Levine and Silk have offered a provocative step toward the resolution of the polyandry problem.

DANIEL M. T. FESSLER

*Department of Sociology and Anthropology, Hofstra University, Hempstead, N.Y. 11550-1090, U.S.A.*  
(socdmf@vaxc.hofstra.edu). 13 XII 96

Levine and Silk's essay is of the type needed to end the antiquated "nature versus nurture" dichotomy. However, it lacks a well-integrated explanatory model. Although they state that sociocultural and evolutionary theories are concerned with different levels of explanation, the authors never articulate the relationship between these analytic levels. Are cultural understandings about polyandry the product of biologically driven

calculations about reproduction, or do they somehow arise in parallel with but distinct from innate tendencies?

The authors' difficulty in connecting the biological with the cultural stems from their adoption of the Darwinian social science position (Symons 1992), the view that behavior is an attempt to maximize fitness. Evolutionary psychology, in contrast, asserts that behavior is shaped by mental modules each of which was selected for in response to specific problems that confronted ancestral humans. The authors imply that evolutionary psychology is of limited applicability in the current discussion, asserting that it does not predict that fraternal polyandry will be less fractious than polyandry among unrelated men. This is based on the assumption that evolutionary psychology views an act as the product of a single mental module. However, a given context may elicit responses from multiple modules, and behavior may therefore reflect interactions among them. Nyinba polyandry exemplifies this.

Levine and Silk echo popular and scholarly sentiment when they state that "humans seem poorly suited" to polyandry. We expect participants in polyandrous marriages to chafe in the arrangement, which is not, we presume, congruent with their general inclinations. Our intuition is that this arrangement is especially problematic for men. There is a consensus that individuals participate in polyandrous marriage because it is advantageous to do so. Darwinian social science suggests that, under particular conditions, actors marry polyandrously so as to maximize their reproductive success. However, if men are calculating gene-counters, then why should polyandry be "difficult"? Seeking to maximize reproductive success might lead polyandrously married men to try to monopolize the reproductive resources of their wives, resulting in conflict among co-husbands. However, what this explanation fails to capture is the *emotional tenor* of these sociosexual relationships. I suggest that co-husbands *do* wish to monopolize their wives, but they do so principally for one reason—they are *jealous*. Male jealousy is part of a proprietary attitude towards female sexuality (Wilson and Daly 1992). It is this which leads observers to view polyandry as counterintuitive and inherently problematic. Male attitudes are best explained as the product of a mental module which was originally selected for because its possession increased reproductive success. This module continues to influence male sociosexual behavior irrespective of reproductive consequences—husbands do not stop caring about their wives' sexual fidelity following tubal ligation.

Does evolutionary psychology therefore exclude polyandry? Absolutely not. Moreover, the prediction used to dismiss evolutionary psychology (namely, that fraternal polyandry ought to be more harmonious than nonfraternal) is in fact generated by it. Humans universally distinguish kin from nonkin and generally favor the former over the latter. Evolutionary psychology explains this behavior by reference to its original adaptive consequences. Today the module responsible continues to operate independent of fitness consequences—people

care about and for kin even when the latter are dying. Hence, should circumstances be such that men recognized the utility of struggling against jealousy and entering into polyandrous marriages, the existence of this module would make cooperation most likely when co-husbands were close kin. Although jealousy would not go away, its centrifugal consequences would be mitigated by both the practical advantages of polyandry and warm feelings towards kin.

Jealousy is not all-or-nothing: A co-husband who is able to exercise more control over his wife's sociosexual behavior is likely to be less unhappy with the situation than a co-husband who is able to exercise less control. Because an age-based hierarchy among Nyinba fraternal co-husbands may affect access to the common wife, the youngest co-husband is likely to be the most disturbed by jealousy and therefore the most likely to partition.

Age-related prestige discrepancies among Nyinba fraternal co-husbands, though subtle, are emotionally salient (Levine 1988:166). Evolutionary psychology asserts that men possess a module which makes prestige rewarding and its absence punishing (Daly and Wilson 1988). Independent of sexual issues, eldest brothers are therefore likely to find polyandry more rewarding. Thus they experience a positive emotion (pride) from the prestige module which helps to counteract the negative emotion (jealousy) from the proprietary module. Youngest brothers experience negative emotions from both modules (shame + jealousy), making partition attractive.

Nyinba households share pooled production (Levine 1988:111, 125). Discrepancies in power interfere with sharing. Egalitarianism is therefore explicitly prescribed (Levine 1988:115-16). Because of the antithetical relationship between sharing and prestige seeking, pride is considered morally reprehensible (Levine 1981:109). Likewise, because well-being is contingent on the success of fraternal polyandrous households, jealousy is considered a principal moral failing, while brotherly solidarity is a principal virtue (Levine 1988:109, 125). Via emotions, Nyinba culture thus counteracts those behavioral tendencies which interfere with the Nyinba mode of adaptation and encourages those tendencies which reinforce it.

Men are prone to feel proud when they succeed, even if they are impotent. Elderly couples still struggle with jealousy. And people love relatives who are terminally ill. Human beings are motivated by emotions produced by mental modules once shaped by selection. Today, every culture builds on and grapples with these elementary components.

A point of clarification: Most Nyinba men who partition are younger than their wives and leave to marry women younger than themselves. Levine and Silk explain this with reference to a universal preference for younger wives. However, that preference results from a module which gauges female sexual attractiveness on the basis of cues indicative of age, hormonal status, parity, fecundity, and health (Symons 1995). Because older and younger co-husbands possess the same module,

both are likely to find women younger than their wives more attractive. Younger husbands, being more disgruntled for reasons described above, are more likely to leave and remarry, and when they do their choices are influenced by an attraction to youth.

BARRY HEWLETT

*Department of Anthropology, Washington State University, Pullman, Wash. 99164, U.S.A. 15 XII 96*

This is a substantial contribution to our understanding of polyandry because it utilizes precise field data to evaluate competing hypotheses regarding the nature of polyandrous marital relations. The most interesting contributions are that (1) land availability does not seem to be an important factor in brothers' remaining married to the same wife and (2) the degree of relatedness of co-husbands does not influence marital stability. Thus, important aspects of previous ecological and evolutionary hypotheses about polyandrous marriages are rejected. The article is also important because the authors seriously consider sociocultural hypotheses, distinguish proximate and ultimate explanations, and incorporate Nyinba explanations for polyandrous relations into their evolutionary analysis. They demonstrate sensitivity to the role of culture in shaping human behavior and the complementarity of sociocultural and evolutionary approaches.

While the article provides many insights into polyandrous marital relations, the methods generate some questions about the results. What do men do when they are away for long periods of time for trade and herding? Presumably these are the younger brothers, and presumably they are having sexual relations while they are away (the BBC film *Dragon Bride* gives this impression). Do Levine's birth histories of men include births outside of legal marriage? Are births outside of marriage common, and are they likely to be reported? Also, what explanations do younger brothers give for partition (e.g., do they have problems with access to the wife, or are they simply attracted to a younger woman in the village?), and do per stirpes inheritance negotiations among brothers influence marital relations? While land availability does not seem to be a prime mover in partition, there is some indication that ecology at least in part influences polyandry. For instance, the cultural preference for three husbands in order to make a reasonable living suggests that this is not a bountiful natural environment.

The article does a wonderful job of illustrating intracultural diversity of polyandrous marital relations but seldom addresses the emergence or ecological adaptability of this type of marriage. Nyinba men's behaviors are generally consistent with evolutionary theory (i.e., younger brothers in large sibling groups seek other marriage partners because of decreased reproductive success in polyandrous marriage), but this all takes place in a cultural context in which polyandry is accepted if not preferred. The authors' results, concluding remarks, dis-

cussion of Berreman's culture-history hypothesis, and statement that "there are no commonalities among polyandrous societies which distinguish them unambiguously from nonpolyandrous societies" suggest that evolutionary biology is useful for understanding intra-cultural variability in polyandrous cultures but that cultural evolutionary processes (Cavalli-Sforza and Feldman 1981, Boyd and Richerson 1985) may be more useful for explaining the cross-cultural distribution of polyandry. This is consistent with recent cross-cultural studies which indicate that the cultural diversity and geographic distribution of kinship and family features of cultures may be better explained by cultural evolutionary than by ecological forces (Guglielmino et al. 1995).

RUTH MACE

*Department of Anthropology, University College London, London WC1E 6BT, U.K. 10 1 97*

I am not convinced that polyandrous marriage is as unusual as it at first appears, at least in some respects. Levine and Silk present, amongst other data, evidence that boys with many elder brothers tend to have lower reproductive success amongst the polyandrous Nyinba. This is partly due to their wives' being older. Similar birth-order effects are certainly not unique to polyandrous marriage. My own data from the Gabbra—a mildly polygynous pastoralist group from the north of Kenya—show a very similar effect (fig. 1). In this case, the decline in male reproductive success with birth order is due both to later marriage and to smaller gifts of live-

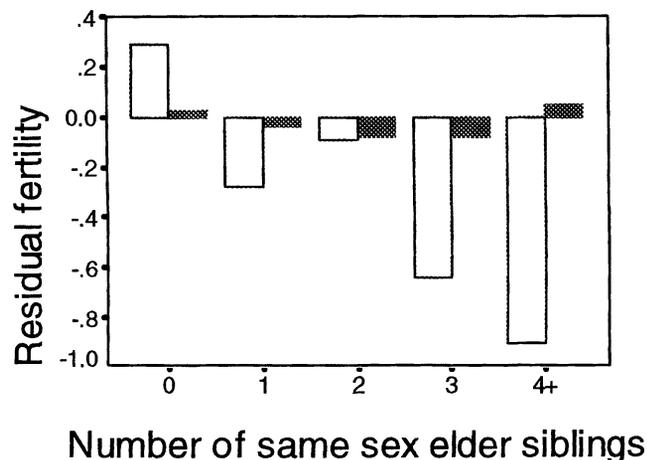


FIG. 1. *Fitness as a function of birth-order in the Gabbra (a polygynous, patrilineal African society). Residual fertility is number of live births relative to same-age same-sex individuals. Number of elder brothers is a significant negative correlate of fitness for males (white bars), but birth order does not affect fitness for females (stippled bars). Data from Mace (1996).*

stock from their parents (Mace 1996). Low (1991) found that younger brothers had lower reproductive success than elder brothers amongst monogamous 19th-century Swedish farmers because of the inability of younger sons to acquire farmland. In all these cases, the birth-order effect is shown for males rather than females. What all these groups have in common with the polyandrous Nyinba farmers is a culture based on the inheritance of resources over which brothers are in competition. A less direct parallel might be found in the levirate system of widow inheritance by younger brothers, common in Africa, wherein younger brothers are sometimes pressured into marrying older women somewhat against their will. Sulloway (1996) argues that birth order influences fundamental aspects of our personality, perhaps predisposing later-born sons (he does not present much information on women) to be more rebellious and embark on riskier and more unconventional methods of making a living. This study mainly concerns men of European origin. What may possibly be one of the more intriguing consequences of low reproductive success for younger brothers is a phenomenon published in recent work from Canada (Blanchard and Zucker 1994, Blanchard and Bogaert 1995) indicating that birth order was "the single most reliable demographic difference between homosexual and heterosexual men." The significant effect relates strictly to number of elder brothers, not number of elder sisters, sibling sex ratio, or parental age.

If inherited resources matter, the economic and reproductive prospects of children may be largely in the hands of their parents. Sibling competition is frequently resolved by parents on the basis of birth order, and younger brothers may have few options in the face of this discrimination. Could it be that polyandrous marriage is just one solution to a problem faced by parents throughout the world as populations approach carrying capacity, of which primogeniture, the levirate, and even homosexuality are other examples? These are all fitness-maximizing strategies which parents use to maximize their grandparental reproductive success when heritable resources are scarce.

A. R. N. SRIVASTAVA

*Department of Social Anthropology, University of Allahabad, Allahabad, India.*

This paper demonstrates very clearly the ways in which demographic variables in conjunction with economic factors shape the patterning of the polyandrous behaviour of the Nyinba. Over the few past decades (more precisely, during the 1970s), social-cultural anthropologists have demonstrated how demographic factors such as distribution of siblings, their relative ages, their ages relative to their fathers'/marriage ages, age at the birth of first and last sons, spacing of births, distribution of household estate (land and forest), etc., determine or regulate the forms of domestic organization over time. This has been aptly called the "developmental cycle in

domestic groups" (Goody 1958, McNetting, Wills, and Arnold 1984). In my view, Levine and Silk's argument is in no way very different from earlier processual analyses of social structure. In other words, how polyandrous practice comes to be perpetuated or abandoned from one generation to the next can be grasped quite well by studying Nyinba households from a developmental perspective. Elsewhere I have demonstrated the methodology for determining the phases/paths in domestic groups of the Korwa, a tribal community of Central India (Srivastava 1979, 1994). Extending this analysis to the Nyinba it can be established and even predicted how the phases of households are associated with the stages of polyandrous marriages—beginning, maturity, and decline. It is possible that a terminated household may develop into a polyandrous household.

My intention here is only to point out that predicting social-cultural phenomena such as kinship behavior, marriage and inheritance patterns, etc., from demographic variables began to appear in the anthropological literature some two decades ago. With respect to polyandrous marriages, however, Levine and Silk's intellectual exercise is a contribution.

ECKART VOLAND

*Zentrum für Philosophie und Grundlagen der  
Wissenschaft Universität Giessen, D-35394 Giessen,  
Germany. II XII 96*

Males are reproductive opportunists. What Darwinian anthropologists and Darwinian psychologists have predicted from their knowledge of the principles of biological evolution has been empirically confirmed by Levine and Silk. Even under the rather unusual conditions of cooperative polyandry, males are competing for paternity. They are successful if they constantly keep an eye on their reproductive opportunities, weigh the costs and benefits of their options, and, if need be, are willing to be flexible and renounce a previous way of life in favor of a more advantageous alternative one. Levine and Silk have shown us which factors are included in the balance. Their study is behavioral ecology par excellence.

Only one result does not fit into the picture. Why does the degree of relatedness among co-husbands not seem to influence marital stability? Could it be that Levine and Silk did not choose the best of all possibilities for testing their thesis concerning the impact of genetic relationships on the stability of marriages? Would it not make more sense and be more sensitive to compare the average genetic relationship of the "active partitioners" with that of the "passive partitioners"? The hypothesis would thus be: If a household divides, there is a greater probability—other things being equal—that the genetically most remote co-husband will be the one to dissolve the cooperation. Perhaps the material would allow a somewhat more differentiated reanalysis along these lines.

However, females are also reproductive opportunists. One would have been only too glad to know what role

they play in this scenario. Mating systems are always only temporary (and under the circumstances very fragile) compromises in the "battle of the sexes." And yet polyandrous systems correspond more to genuine female than to male interests. After all, polyandrously married women achieve greater reproductive success than women in monogamous marriages. Their advantage continues even into the grandchild generation (Crook and Crook 1988). The more men that contribute to the family economy, the better for the lifetime reproductive success of the women, which is why the latter should make every effort to avoid a partitioning of the household. Surely specific behavioral strategies on the part of the women are necessary to convert this "structural bonus" of polyandry into a personal advantage as great as possible.

What could these strategies look like? For example, it could be surmised that explanations concerning paternity are not always made according to the mother's best knowledge and belief but, under certain circumstances, also according to "strategic" viewpoints, in order to bind a potentially "active partitioner" or a particularly productive worker permanently to the household. Are there any ethnographic indications of this?

Women may also—insofar as their sexual autonomy permits this—turn to the younger co-husbands who have been disadvantaged by the senior husband for sex in a manner comparable with the situation of polyandrous dunnock females. If they have to fear that the beta male may renounce polyandry because of the monopolization attempts of the alpha male, then they will increasingly encourage the beta male to engage in copulation (Davies 1990). In any case, women will oppose the latent instability of polyandrous marriages with efforts to achieve marital stability. Therefore, I should like to ask the authors to supply us with the second part of the story: "Sources of Stability in Polyandrous Marriages: Female Tactics."

## Reply

NANCY E. LEVINE AND JOAN B. SILK  
*Los Angeles, Calif., U.S.A. 7 I 97*

We are gratified to find that our efforts to bridge the theoretical perspectives of sociocultural anthropology and evolutionary biology and apply them to the study of human kinship behavior have met with a receptive audience. The authors of these comments have raised a number of important issues. In our response, we will first consider general questions about the nature of our analysis; then we will address issues directly related to our results and expand on a number of points meriting further clarification. Finally, we will discuss the kinds of additional data needed to answer a number of fundamental questions raised in these comments.

*Conjoining sociocultural and evolutionary theories.* Both Fessler and Hewlett call for an integrative theoretical framework to link the perspectives of evolutionary biology and sociocultural anthropology. Fessler advocates an approach based on evolutionary psychology, while Hewlett suggests that it may be useful to focus on cultural evolutionary processes. We agree that a synthetic explanatory framework would be desirable, and our results suggest that such a synthesis would be fruitful. However, we do not expect this to be a simple endeavor; the construction of a general theory that connects evolutionary processes to human psychology, social structure, and culture and that encompasses historically particular and culturally idiosyncratic systems of meaning and the ultimate selective pressures on human behavior will be an enormous intellectual achievement.

Fessler speculates that mental modules which mediate nepotism, sexual jealousy, and prestige jointly influence the emotional tenor of marital relationships and influence men's satisfaction with their marriages. He also asserts that we "imply that evolutionary psychology is of limited applicability in the current discussion . . . [because] it does not predict that fraternal polyandry will be less fractious than polyandry among unrelated men." We did not intend to question the general utility of evolutionary psychology; rather, we wanted to point out that humans may not be psychologically prepared to cope with all current contingencies. On the one hand, as Fessler notes, men's responses to polyandry might be influenced by several mental modules—the modules for sexual jealousy, altruistic feelings toward kin, and prestige. Thus the negative emotions associated with sexual jealousy might be counterbalanced by the positive value placed on cooperating with kin. On the other hand, if mating practices akin to polyandry were not present in the environment of evolutionary adaptedness, men might find coping with these competing inclinations to be stressful. One way of answering this question would be to see if men find fraternal polyandry more congenial than nonfraternal polyandry. Such a resolution seems unlikely, however, because of the rarity of polyandrous practice cross-culturally.

Hewlett notes that we illustrate intracultural variability but do not address the broader question of intercultural variability, that is, why polyandry arises in some societies and not others. He suggests that evolutionary biology may be useful for understanding variation within a society, while cultural evolutionary processes may hold the key to understanding variation between societies. We are not convinced, however, that there is such a clear distinction between forces shaping intercultural and intracultural variation. Boyd and Richerson (1985), for example, have explored the dynamics of a set of cultural evolutionary forces that influence individual behavior within cultures, sometimes in nonadaptive ways.

*The implications of the data.* As Borgerhoff Mulder and Haddix point out, our results do not support the hypothesis that "brothers will share paternity whenever

economic and demographic circumstances limit the ability of each to support a monogamous family" and its logical corollary that households poorer in land are more likely to be polyandrous than their better-off neighbors. However, we are reluctant to embrace their conclusion that these data constitute a convincing "refutation of this widely cited model for polyandry." While men's decisions to leave their polyandrous marriages do not seem to be consistently influenced by the size of their household's landholdings, it is plausible that constrained ecological or economic circumstances, particularly land shortages, may have shaped the ways in which polyandry developed as a social institution in the Himalayas. Once established, other cultural beliefs and values may bias individual decisions about the desirability of polyandrous unions.

Mace suggests that the negative relationship between birth order and reproductive opportunities which we observed may extend beyond the boundaries of Nyinba society. She suggests that polyandry, primogeniture, the levirate, and homosexuality may be alternative mechanisms for maximizing grandparental reproductive success in conditions of economic scarcity. If so, then there should be a consistent relationship between such cultural practices and ecological circumstances or economic opportunities. If the hypothesis is confirmed, then we will face the intriguing question of why one alternative is favored in some societies but not in others. And if these are functionally equivalent alternatives, then we must ask why certain alternatives, such as primogeniture, are common while others, such as polyandry, are quite rare.

Dickemann points out that there has been no adequate evaluation of the Darwinian proposition that polyandry, like other human behaviors, is adaptive in terms of reproductive success, since this would require assessing men's and women's genetic contributions over several generations. Following a similar line of argument, Voland points out that polyandry may be more advantageous to women than to men; in Ladakh, for example, polyandrously married women have more grandchildren than monogamously married women have. These issues are important but lie beyond the scope of the present paper. We have not attempted to evaluate whether polyandry is an adaptive strategy for men or women; instead, we have focused on the proximate factors causing men to sever their polyandrous marriages. In order to evaluate whether polyandry is adaptive, one must compare the fitness of individuals who marry polyandrously, monogamously, and polygynously for fitness. Such analysis is complicated by the necessity of tracking several components of fitness. Men who marry polyandrously, for example, achieve individual fitness benefits via their own offspring and inclusive fitness benefits via the offspring of related co-husbands. Since the Nyinba data set can be used to compare the fitness of men and women who marry polyandrously, polygynously, and monogamously, we plan to conduct this comparison.

*Points of clarification.* Speaking in cultural terms,

Fessler is on the right track when he posits that younger brothers dislike their junior and therefore marginal status in the marriage and household. One major source of trouble in polyandrous marriage is the affront to younger brothers' prestige. Junior co-husbands frequently complain that they are dissatisfied with their marriages because they are treated poorly and do not receive a fair share of sexual attention from the common wife. However, it cannot be said that they typically suffer from *jealousy*. Nyinba, like other ethnic Tibetans, have a term (*mig ser*) for this emotion and describe it in a manner similar to Euro-American commentaries on the subject. Although Levine did collect rare reports of men's being jealous of their polyandrous co-husbands, this was not the predominant theme in men's complaints about their marriages.

Fessler's note about why men may find younger women more attractive notwithstanding, we suggest that active partitioners may be marrying younger women not only because this is what they prefer to do but also because there are more young women eligible for marriage (see n. 21). And, as Hewlett's comment reminds us, when men partition and marry younger women they do not report their attraction to the younger woman (or dissension with their brothers) as the cause for the breakup of their former marriage but rather mention dissatisfaction with their prior marriage and relations with their former wife.

Land-short Himalayan households do have the option of securing additional income through animal husbandry and long-distance trade, as Borgerhoff Mulder and Haddix point out. We did not test the impact of these alternative economic opportunities on partition for a number of reasons. Each Nyinba household has an equal chance of expanding its animal holdings or engaging in trade—this depends only on the number of healthy brothers. Both endeavors require minimal initial capital investments. For example, a man could start with a few pack animals and after a few years of careful husbandry and, possibly, working as a herder for others increase his herd to more than adequate size. This is why Levine (1988:215) describes trading as "the flexible option." In addition, we note that even in households with the largest farms, only one man is called upon to stay home to supervise agriculture.

We would like to correct one mistaken impression voiced in Chandra's comments. Our focus in this paper was not the "failure" of polyandry as a marriage system but rather why particular marriages succeed or fail. However, we thank Chandra for drawing attention to a commonly noted phenomenon: transitions to a cash economy and increasing integration into nationwide sociocultural systems are often accompanied by a decline in polyandry's incidence.

As Voland notes, our results deviate from evolutionary biological predictions in only one way: the degree of relatedness among co-husbands does not affect marital stability. He suggests that this may be because we did not choose the most sensitive test of this hypothesis, that is, whether the least closely related co-husband ini-

tiates partition. We have gone back to the data to examine this question. In 9 of the 21 partitioning households for which we have appropriate data, all the co-husbands were equally closely related. In the remaining 12 households the degree of relatedness among co-husbands varied. In 7 of these households, one co-husband initiated the partition. The active partitioner was the least closely related co-husband in only 3 of these 7 households. When partitions were jointly initiated by more than one co-husband, the picture becomes more complicated, but the results are more or less the same. In 3 cases the active partitioners were more closely related to each other than to the other co-husbands, while in 2 cases the active partitioners were less closely related to one another than to the other co-husbands. Thus the degree of relatedness among co-husbands does not seem to affect the role men play in partitions.

In response to Hewlett's question, we note that Nyinba traders report visiting prostitutes in Indian border towns, but no one has ever reported having a child out of wedlock with a non-Nyinba woman. By contrast, Levine collected a number of reports of illegitimacy within the Nyinba community. Most such children die young, but some do survive. Although we can never be certain who fathered a given child, Nyinba keep careful track of allegations of illegitimate paternity in order to avoid incestuous marriages (see Levine 1988:167n). Three of the men whose birth histories we surveyed were reported to have had an additional child out of wedlock. One was the eldest brother in a marriage of two brothers, one was the second brother in a marriage of three brothers, and one was the youngest brother in a marriage of three brothers. In our calculations of relatedness, we treated reported illegitimate sons as fathered by men unrelated to their co-husbands' fathers.

Srivastava correctly points out that polyandry must be understood in terms of domestic developmental cycles. This is because the brothers in any given generation are likely to partition during what has been termed the family-building stage of domestic development. However, regularized cyclical processes are quite a different matter from social change, as Fortes (1949:54–55) pointed out in his pioneering article on developmental processes in domestic groups. It was our contention that understanding the sources of stress in polyandrous marriages would support more accurate predictions about which marriages would undergo fission and which would persist until the partners' deaths. Ideally, understanding points of stress would also contribute to fuller explanations of why polyandry has declined in frequency in some locales while persisting in others. The prevailing view in the literature has been that polyandry everywhere entails major contradictions; while the Nyinba data support some of the commonly held assumptions, our findings have called others into question. Evolutionary biology suggests that men are more likely to be dissatisfied with marriages in which their reproductive opportunities are limited, while sociocultural anthropology and evolutionary psychology suggest that men are more likely to be dissatisfied with mar-

riages in which their prestige is low and they have less control over their wives' sexuality. Nonetheless, despite the disadvantages for some participants, polyandry developed and has persisted over generations in a number of locales where it became culturally valued and integrated with other facets of the social system—the household system and the system of domestic labor organization in particular. The fact of the matter is that marriages in all societies create stress for participants, and some marriages in every society “fail,” that is, lead to disaffection, separation, or divorce. For many individuals, however, marriage “succeeds,” in the sense of persisting throughout the participants' lifetimes and providing them a host of perceived advantages. The same can be said for Nyinba polyandry. As Levine has argued, “most men and women find polyandry a personally comfortable form of marriage and one that suits culturally defined practical goals” (1988:159). Some individuals do not find their polyandrous marriages satisfactory, however, and the aim of this paper was to delineate the factors which weaken such marriages and to test empirical evidence of marital breakdowns against prevailing theoretical models for understanding human kinship behavior.

*Additional data needed.* Several commentaries emphasize the need for larger samples and more extensive analysis. Borgerhoff Mulder and Haddix suggest that a multivariate analysis is needed to tease apart the effects of various factors on decisions to partition. Chandra argues that robust data from a number of societies are necessary to show whether the pattern of younger brothers' siring fewer children is widespread. Crook argues that larger, comparative data sets are needed to examine the factors that influence marital systems in the Himalayan region. Dickemann calls for assessment of reproductive success over several generations. The scope of our analysis and the power of our conclusions were clearly limited by the fact that partition is a relatively uncommon event among the Nyinba and our sample of such events was relatively small. Thus, we agree that there is a pressing need for more extensive information about the factors that influence the dynamics of polyandry in the Himalayas, and we hope that this article will help to stimulate such work.

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