

SHIPIBO POLYGYNY AND PATRILOCALITY

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Cultural change is at once a ubiquitous and a bewildering feature of the modern world. It is also one of the most difficult to measure, especially in societies being transformed from tribal to peasant to urban culture. In this century, anthropologists have almost routinely witnessed profound and startling changes in the tribal societies they have studied, especially those studied just before the beginning of World War II (Wagley 1977).

Accompanying these changes has been rapid population growth, only part of which is explained by declines in mortality. Another factor that may contribute to rapid population growth is increased fertility, even though this is not predicted by the classic demographic transition theory (Handwerker 1986a; Nag 1980). The alarmingly rapid increase in human population in modern times has spawned numerous theories about its causes and antecedents. From an estimated annual growth rate of 0.001 percent during the Pleistocene (Hassan 1981) to 0.1 percent during the Neolithic (Saucier 1972), we are now experiencing a yearly global population increase of at least 1.7 percent, with regional increases much greater than that (Zachariah and Vu 1988). These increases clearly began before modern medical science began to affect mortality rates. Declining mortality rates cannot fully explain the increasing population growth rates; systematic increases in fertility must play some role as well.

In fact, the disruption of traditional cultural controls on fertility may be a significant factor in the population growth of some ethnic groups (Nag 1980). Anthropologists have identified natality controls in ancient and tribal as well as contemporary industrial societies (Barnett, Jackson, and Cann 1971; Bourgeois-Pichat 1967; Cowgill 1975; Himes 1970; Weisbard 1957). Among the Nunamiut, for example, cultural change—especially the onset of sedentism—resulted in initial higher fertility, which was more important than mortality declines in contributing to rapid population growth (Binford and Chasko 1976). The association of modernization with sedentism, a decline in breastfeeding, a decline in postpartum sexual abstinence, and a shortening of the average time interval between births has also coincided with higher fertility and more rapid population growth in groups as various as the Dobe !Kung (Howell 1979; Kolata 1974; Lee 1972), Canadian Indians (Romaniuk 1981), and tribal populations in Zaire (Romaniuk 1980).

Social and cultural change is a major feature of the modern world. George Murdock and John Whiting have provided a theoretical framework for measuring social and cultural change by describing residence patterns and family structures, by showing how they may be linked, and by showing how changes in them can signal cultural change. This study tests the Murdock and Whiting hypotheses by determining the prevalences of polygyny and patrilocality in eight Shipibo Indian villages located in the eastern Peruvian Amazon. It also tests the hypothesis, derived from Murdock and Whiting's conclusions, that polygyny is linked to lower fertility by examining the effects of cultural change on fertility. Three indicators of cultural change are identified and measured: residence patterns, family structure, and fertility. [Shipibo, polygyny, patrilocality, Peru, Amazon, cultural change, fertility]

The view that fertility may increase with modernization is in conflict with the classic view that fertility among tribal, preindustrial peoples is already as high as it can get. However, various authors have held that the former is exactly the case. Carr-Saunders (1922), one of the first authors to write about this subject, observed that traditional peoples had methods of fertility control, and a few others, such as Krzywicki (1934), supported his view. In 1955, Devereaux published a landmark study showing that abortion was nearly universal in human societies; he found it practiced in more than 350 tribal societies worldwide.

Studies by Ford (1964), Nag (1962, 1975, 1980), Stott (1962), and Dorjahn (1958), as well as reviews by Dumond (1965, 1975) and Lorimer (1954), tend to support the conclusion that fertility limitation has been common among traditional societies. Firth (1957) showed that the Tikopia had definite ideas about natality limitation, ideas recognizing the environmental limitations imposed by life on an island, and he suggested that disruption of these adaptations by Christian missionaries had led to rapid population growth and other dislocations.

Polygyny is commonly associated with postpartum sexual abstinence, and this association should logically lead to longer birth intervals.¹ A decline in the practice of postpartum sexual abstinence normally associated with polygyny may contribute to increased marital fertility, as is generally the case in Africa (although some studies have argued the contrary; see Aborampah 1987; J. Caldwell and P. Caldwell 1977; Chojnaka 1980; Cleveland 1986; Handwerker 1986b, 1986c; Isaac 1980; Olusanya 1971; Schoenmaeckers, Shah, Lesthaeghe, and Tambashe 1981; Sembajwe 1979).

Few empirical field research studies have been done to elucidate this issue, and a common flaw in most studies published to date is the lack of individual fertility data relating polygyny to birth interval lengths and fertility. Moreover, there are few studies that compare the fertility of polygynous to that of monogamous women within one society, in part because cultural change affecting fertility is most likely to be occurring in tribal or peasant societies without adequate records or even a system of counting, and in part because information concerning these societies is usually gathered by anthropologists who are not trained to collect demographic data (J. Caldwell, P. Caldwell, and B. Caldwell 1987; Petersen 1975). An important exception is the work of Borgerhoff Mulder (1989), whose study of the Kipsigis showed no important differences in the fertility of women in polygynous and monogamous marriages. Garenne and van de Walle's study of the Sereer, however, showed lower fertility among polygynous women than among monogamous women (1989), with lower-ranking polygynous women (second or third wives) having lower fertility than higher-ranking ones (first or second wives). Outside Africa, studies focusing on groups as disparate as Mormons (Anderton and Emigh 1989; Smith and Kunz 1976), residents of Bangladesh (Shaikh, Aziz, and Chowdhury 1987), and New Guinea tribes (Bowers 1971; Van Arsdale 1978; Wood, Johnson, and Campbell 1985) have shown that polygyny reduces female fertility.

In fact, polygyny itself does not necessarily affect female fertility, but it is an intermediate variable that may affect not only the practice of postpartum sexual abstinence, which does affect fertility, but also the general frequency of coitus (Bongaarts 1978; Bongaarts and Potter 1983). Among the proximate factors that affect fertility is postnatal infecundability induced by lactation-suppressed anovulatory amenorrhea, which appears, at least in the case of the !Kung, to have an important effect (Konner and Worthman 1980; Lee 1980). Lactation is an uncertain method of ovulation suppression, but it is relatively effective in tribal societies in which the infant can nurse intermittently at frequent intervals, as is the case with the Shipibo (Berman, Hanson, and Hellman 1972; El-Minawi and Foda 1971; Knodel 1977; Lesthaeghe, Ohadike, Kocher, and Page 1981; Masnick 1979; McCann, Liskin, Piotrow, et al. 1981; Treolar 1974). Resumption of intercourse, however, can lead to conception, especially if lactation is not frequent or if the hormonal suppression of ovulation is not strong.

While anthropologists have eloquently described traditional tribal cultures, they have less frequently found it possible to document cultural change and only rarely to measure it. Mur-

dock (1949) asserted that change in a social system regularly began “with a modification in the rules of residence” (1949:221). Other changes in the social system—in the forms of extended families or clans, in kinship terminology, and so on—began after change in the residence rules (1949:222). In the same classic work, Murdock also noted that polygyny was almost impossible under a system of matrilineal residence unless the polygyny was sororal in form. Therefore, anything which favored polygyny “likewise favor[ed] the development of a patrilineal system” (1949:206). He added that a change from any form of unilineal residence—matrilineal, patrilineal, or avunculocal—had a “disruptive effect upon existing unilinear groupings” (1949:208). In short, cultural changes, as reflected in social structures, had widespread and multiple effects.

How can we measure such changes? What are their effects, and how can we measure them? And, of particular interest here, how are such observed cultural changes related to the extraordinarily high fertility found in some modernizing tribal societies (P. Caldwell and J. Caldwell 1990; Hern 1977)?

Whiting (1964:511) pointed to another dimension of this problem when he postulated a link between postpartum sexual abstinence, polygyny, and patrilineality. In a cross-cultural study, Whiting observed that societies with a high frequency of polygyny (30 percent or more) were also characterized by patrilineality and by the practice of postpartum sexual abstinence. South American societies, he noted, were an exception, for they generally used abortion rather than postpartum abstinence as a means of fertility control (1964:511). In linking these three cultural traits, he suggested that all three tended to be found in tribal societies inhabiting tropical forests and that the protein-deficient diets common to such environments could be a reason for fertility regulation via prolonged postpartum sexual abstinence: long birth intervals could permit better maternal recuperation from pregnancy and better infant survival. Whiting pointed to native assertions that a concern with infant health was one reason for postpartum sexual abstinence.

In fact, there is strong evidence that a long birth interval is linked to better infant survival. Yerushalmy (1945; Yerushalmy, Bierman, Kemp, Connor, and French 1956) demonstrated the existence of the link, and subsequent studies (Federick and Adelstein 1973; Hobcraft, McDonald, and Rutstein 1983; McCann et al. 1981; Wolfers and Scrimshaw 1975; Wray 1971; Zimmer 1978) have made it all but incontrovertible. Barnett, Jackson, and Cann (1971), for instance, showed that child health was a specific goal of long birth intervals in a Guatemalan Indian society. P. Caldwell and J. Caldwell (1981), Lesthaeghe (1980), Lesthaeghe et al. (1981), Gray (1981), and Cleveland (1986) all cited African examples of the same phenomenon, observing that long birth intervals were usually designed not to limit but to increase family size. For example, the objective of the Kusasa was to maximize the total number of children by assuring their survival (Cleveland 1986). Wray (1971) argued that prolonged lactation, especially with numerous pregnancies, required good protein intake, a lack of which, according to Whiting’s theory, was another reason for prolonged sexual abstinence and longer birth intervals.

Nag (1962), Dorjahn (1958), Abernethy (1979), and Lesthaeghe et al. (1981) all lent support to Whiting’s hypothesis that societies with a high frequency of polygyny would also have a long period of postpartum sexual abstinence, while Talbot (1926), Krzywicki (1934), and J. Caldwell and P. Caldwell (1977) observed that polygynous women practiced postpartum abstinence more strictly than monogamous women did (also see Harris and Ross [1987]). Lorimer (1954), Nag (1962), and Dorjahn (1958) argued further that postpartum sexual abstinence was associated with low fertility, although Nag (1962) noted that data existing at that time did not support the hypothesis that polygyny was associated with reduced fertility. Some years later, however, Handwerker (1986b) asserted that in Liberia, polygyny appeared to have a dampening effect on fertility. In New Guinea, Bowers (1971) found that polygyny led to fewer average births per woman but that polygyny was declining in tribal societies.

In Africa, Schoenmaeckers et al. (1981) found that the postpartum taboo was universal and did not reflect a climatic influence as Whiting had predicted it would. Lesthaeghe (1980) ar-

gued that the taboo was not confined to the tropical forests and that it was not a response to protein deficiency. Chagnon, Flinn, and Melancon (1979) observed that although the Yanomamö had long birth intervals, there was no evidence of protein deficiency among them.

Regardless of the reasons for postpartum sexual abstinence, infanticide, and other traditional methods of fertility and natality regulation, there is accumulating evidence that some of these methods are being disrupted by cultural change and modernization, and that the disruption, as noted by Dumond (1975), Polgar (1968, 1971, 1972), and Nag (1980), can contribute to increases in fertility. In separate studies, Nag (1980) and Ford (1964), for example, both linked increases in fertility to a decline in the observance of postpartum sexual abstinence. Nag cited several studies linking lower fertility with high prevalences² of polygyny, all in Africa (1975); he also commented on the lack of published literature relating family type to fertility at an aggregate or societal level. Whiting urged social scientists to conduct tropical South American field studies of some of these issues (1964:511). Studies of the prevalences of polygyny and patrilocality can test Murdock and Whiting's hypothesis that the two are linked, although Murdock suggests that in South America, the type of polygyny, sororal, tends to be linked with matrilocality.

The clear demographic implication of Whiting's link between polygyny and postpartum sexual abstinence is that their presence should be associated with fertility that is lower than in societies in which these cultural traits are not found. Similarly, a declining prevalence of polygyny and postpartum sexual abstinence should be associated with increasing fertility.

The Shipibo of Peru are widely reported to be matrilocal and to practice sororal polygyny (Abelove 1978; Behrens 1984; Hern 1971, 1977, 1988; Murdock 1967:226). A cohort study of one Shipibo community showed the highest documented fertility of any human group (Hern 1977). In spite of an extensive cultural system concerning reproduction and the use of herbal contraceptives (Hern 1976), at the time of the study (1964–69) the group was experiencing a Total Fertility Rate³ of 9.935, meaning that the average woman had ten term births; the intrinsic rate of population growth was 4.89 percent per year, at which rate the population would double in less than 15 years. Since the exceedingly high fertility must necessarily have been a recent phenomenon that could not be sustained over a long period, I suggested a causal association with an apparently declining prevalence of polygyny (Hern 1976:18, 1977:366). This hypothesis would be consistent with Whiting's view that polygyny is linked to postpartum sexual abstinence; a decline in these mutually reinforcing customs could result in shorter birth intervals, higher individual fertility, and higher community fertility. First, however, it was necessary to determine the actual *prevalence* of polygyny⁴ in Shipibo communities and then to determine whether the prevalence was positively or negatively related to fertility. And, since residence rules are the first aspect of social organization to change, as Murdock asserts, and polygyny is related to unilocal residence, it was also necessary to determine whether polygyny was related to either patrilocal or matrilocality among the Shipibo, as well as whether its prevalence was related either positively or negatively to community fertility. I therefore decided to test two aspects of the Murdock and Whiting hypotheses: that polygyny is positively associated with patrilocality, except in the case of sororal polygyny (as among the Shipibo), in which it is associated with matrilocality; and that polygyny is negatively associated with fertility, as would be the expected result given Whiting's association of polygyny with postpartum sexual abstinence.

Polygyny is common in human societies, but defining its nature and extent in any society is a challenge. Murdock (1957) determined that polygyny was present in 75 percent of a worldwide sample of cultures and stated that a society could be called "polygynous" if 20 percent or more of the males had more than one wife. The prevalence of polygyny in traditional societies has been documented in some instances, particularly in Africa (Borgerhoff Mulder 1989; Dorjahn 1958; Garenne and van de Walle 1989; Handwerker 1986b; Spencer 1980). However, as White (1988) pointed out, accurate censuses of polygyny are generally unavailable.

Although polygyny is widespread among lowland South American indigenous groups, for example (Jackson 1983; Kensinger 1984), its prevalence and impact on fertility are not well documented. Nearly all South American and African rates of polygyny are cited solely in terms of the number of males who are polygynous. Polygyny, according to Siskind (1973), is part of a strategy, along with practices such as female infanticide, for producing a scarcity of women. Chagnon (1977, 1979; Neel and Chagnon 1968) cited a prevalence of polygyny of up to 50 percent among the Yanomamö but indicated that the prevalence was declining. He also noted that the Yanomamö practiced strict postpartum sexual abstinence with the result that observed birth intervals were long (3.4 years) (Chagnon 1977, 1979), although he made no comparisons between monogamous and polygynous women. The Xavante, who also favor sororal polygyny, have similarly long birth intervals and low observed fertility, but, as with the Yanomamö, these phenomena may be due to infanticide (Neel and Chagnon 1968; Neel and Salzano 1967). Salzano, Neel, and Maybury-Lewis (1967) described a prevalence of 30 percent among the Xavante. The most precise estimates are those of Johnston, Kensinger, Jantz, and Walker (1969), who described a 27 percent prevalence of polygynous unions among the Cashinahua, along with a tribal "population policy" encouraging fertility as a means of countering the effects of a devastating epidemic (Johnston and Kensinger 1971). Ablove (1978) described a polygynous marriage prevalence of 45 percent in a Shipibo village, and Behrens (1984) observed that 11 percent of all nuclear families in a Shipibo village were polygynous. Eakin, Lauriault, and Boonstra (1980) asserted that polygyny as a family structure was no longer found on the Ucayali River but was present in the more remote Shipibo settlements.

My first observations among the Shipibo, in 1964, indicated that several families in the study village were polygynous, but during a return trip in 1969 I noted that a new and much more "traditional" family had joined the village. The newcomers, a large extended family composed of several polygynous nuclear families, obviously adhered to traditional Shipibo cultural patterns more than their fellow villagers did. Unlike other residents, they continued to practice skull deformation in infants, and they appeared to rely quite heavily on kin in subsistence activities and childrearing. They were also more likely to practice face and body painting and to engage in traditional Shipibo crafts such as pottery making and cloth weaving. Their houses were large enough to accommodate several nuclear families, and their residence pattern appeared to be strongly patrilocal (Hern 1976:18).

In describing the new family, which had arrived from a somewhat remote part of the Shipibo culture area, current residents referred to them as "*salvajes*" (savages) and as the "*ejercito de [family name]*" (army of [family name]). They described the more prominent practice of polygyny in the new family as characteristic of the "*antipasados*" (ancestors). A man who had been chief of the village indicated that he had once had three wives, a fact that was corroborated by his relatives and others, but added that polygyny was no longer practiced except among country cousins such as the new family.

Repeated observations over a period of 15 years and reports from other sources suggested to me that the prevalence of polygyny in Shipibo communities was declining as the people gradually adopted Western culture. In fact, the declining prevalence of polygyny might be taken as evidence of their acculturation. The institution of polygyny among the Shipibo has been discouraged since the earliest missionary contacts. In 1697, the Shipibo massacred Jesuit missionaries who were encouraging them to give up this custom (Steward 1948:555). And Protestant missionaries continue the effort with apparent success, as I observed in Pisqui and Ucayali communities during a 1983–84 field trip. In a conservative Shipibo village not included in the current study, Behrens observed that the local Peruvian mestizo *registro civil* refused to record polygynous marriages because he found polygyny repugnant (Clifford Behrens, personal communication, 1986).

As part of a larger study to determine the effects of cultural change on fertility among the Shipibo, I studied eight Shipibo villages on the Ucayali and Pisqui rivers in the Peruvian Amazon basin from July 1983 through October 1984 (see Figure 1).

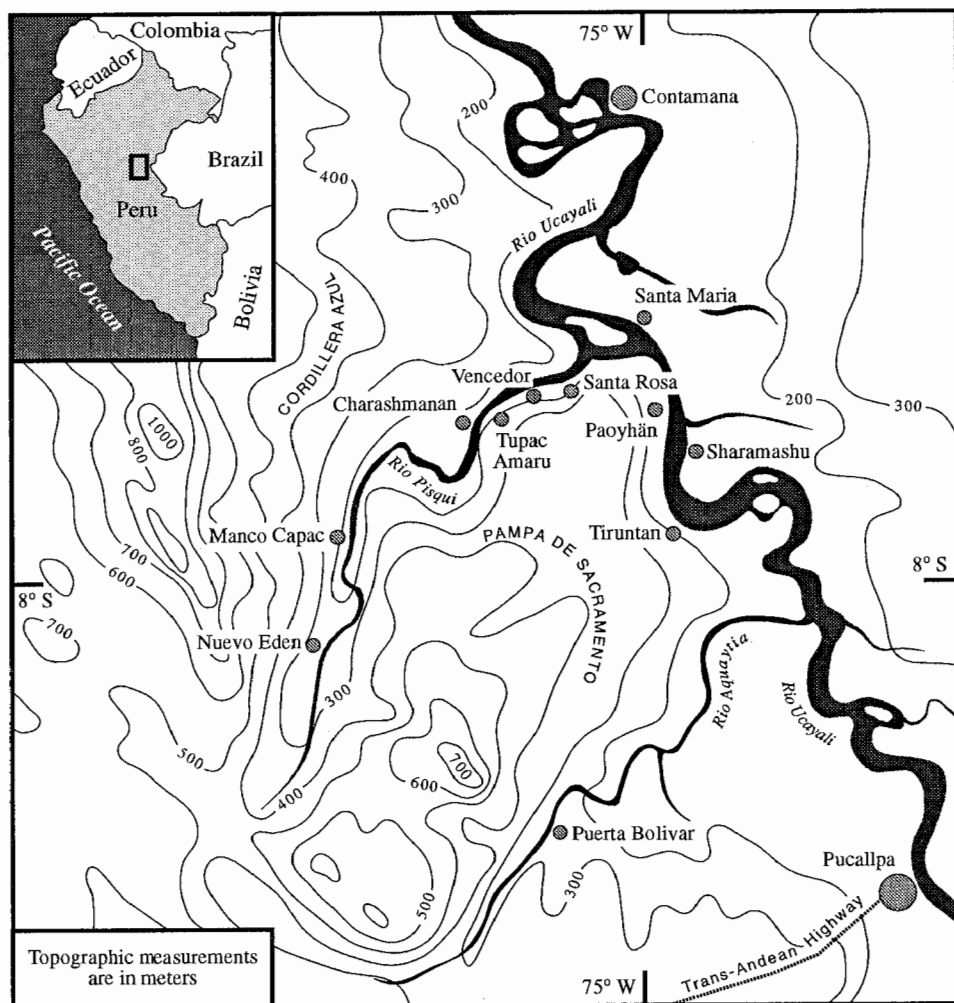


Figure 1. The Pisqui and central Ucayali region. Scale = 1:1,000,000. Based on local maps and satellite photographs.

background

The Shipibo-Conibo are a riverine Panoan group who inhabit the banks of the Ucayali River, its tributaries, and the oxbow lakes of the Ucayali River drainage from Atalaya to Requena (Behrens 1984; Bergman 1980; Lathrap 1970). They have been in contact with Western culture for more than 300 years but maintain a high degree of cultural identity. The Conibo are those members of the linguistic group who live upstream from Pucallpa, a major urban center of the region. Some dialectal variation occurs among Shipibo living on the Pisqui River, a tributary of the Ucayali located just above the town of Contamana. The Shipibo are horticulturalists who rely on fishing, hunting, and gathering for their protein needs (Behrens 1986; Bergman 1980; Campos 1977) and who are increasingly entering the Peruvian cash economy by means of rice cultivation (Behrens 1989).

The Shipibo are matrilineal and may be matrilineal, although the latter point is in dispute (Abelove 1978; Behrens 1984); they generally practice sororal polygyny. According to Abelove (1978:27), a man may take as a second wife any woman his first wife calls sister, but in actual

practice, only the full sisters of first wives are married. Typically, each wife has her own household, or at least her own hearth, usually adjacent to the hearths of other wives. The term for co-wife, *rahuiti*, is also the term for enemy (Abelove 1978:28). The Shipibo practice the sororate, the levirate, and bride service (Abelove 1978; Behrens 1984).

During the past 40 years, the Shipibo have experienced rapid cultural change associated with the aggregation of Shipibo families around missionary-operated schools that have recently been converted into state-sponsored bilingual schools. They have also come into increasing contact with Western culture through the economic system and through the establishment in 1962 of the Hospital Amazonico Albert Schweitzer (Hern 1988), a private health facility near Pucallpa. I first encountered the Shipibo while working as a third-year medical student at the Hospital Amazonico in 1964; I then made field trips in 1964, 1969, 1974, 1979, and 1983–84 in order to conduct censuses, health surveys, and the present study, doing a total of some 20 months of field research among them. In addition to doing research, I provided elementary medical care to the Shipibo and trained and worked with numerous Shipibo health personnel. During this time, I observed an increasing pace of cultural change and economic development, particularly in the largest study village, Paoyhän. Paoyhän is the fission product of an older and more conservative village, Paococha, which was my original research site from 1964 to 1979. Paoyhän is now anomalous because of its large size and the recent addition of a high school, which attracts Shipibo students from a wide area.

In my own early studies of the Shipibo, beginning in 1964, I noted a household polygyny rate of 7.1 percent, with 9.8 percent of all women aged 15 years or older in polygynous unions (Hern 1977). According to local accounts, the prevalence of polygyny was declining. A changing prevalence of polygyny among the Shipibo appeared to offer an opportunity to test the polygyny-fertility hypothesis, particularly because of the high fertility previously observed. In addition, herbal contraceptives, which were widely used by Shipibo women, achieved their putative effectiveness by being associated with sexual abstinence (Hern 1976).

In the course of my research, I never encountered any evidence that the Shipibo wanted large numbers of children. On the contrary, they sometimes made dangerous and desperate attempts to limit fertility (Hern 1976), and I was approached confidentially by numerous Shipibo men seeking fertility limitation methods, including surgical sterilization. I saw no evidence that Christian missionaries actively urged the Shipibo to have large families, but there was some indication that one group, the Seventh-Day Adventists, had encouraged and provided information about birth control.

methodology

I collected information for the study by universal household interview in eight Shipibo communities on the Ucayali and Pisqui rivers, speaking with the head of each household as well as with that person's spouse, if present, and obtaining a complete reproductive history from each woman aged 13 years or older. Care was taken to identify each birth and to define birth interval lengths insofar as possible. In the data analysis, each woman was characterized according to whether she was or had ever been in a polygynous relationship, and each birth interval was characterized according to whether it had occurred in a polygynous relationship or not. A senior wife in a polygynous relationship, for example, would be noted to have been in such a relationship, but her first one or two birth intervals might be characterized as "monogamous" if she had not yet been joined by one or more of her co-wives.

In addition to interviewing household heads and their spouses, I gathered data on women's sisters and other relatives, examined birth records, and consulted widely with family members to determine people's ages, the durations of marriages, and the timing and sequence of births. I also calculated mean length of closed birth intervals for each woman.

It is assumed that polygyny exerts its principal influence on fertility by providing a woman's husband with other partners while she observes a postpartum period of sexual abstinence. In this study, polygynous status serves as a proxy control variable⁵ (Greenland and Neutra 1980) for postpartum sexual abstinence, which is assumed to be one of the most important independent behavioral variables affecting fertility. Since postpartum sexual abstinence is thought to be linked to polygyny everywhere, changes in residence patterns that are associated with polygyny are of critical importance to the study of the relationship between polygyny and fertility. (The degree to which sterile and subfecund women are drawn to polygynous relationships [Borgerhoff Mulder 1985], or whether subfecundity is a result of being in a polygynous relationship, is unknown for the Shipibo.)

In performing my analysis, I had to decide whether any particular woman fell into one or both of two reproductive age ranges, from 15 to 45 and from 10 to 45 years of age. I used the former range in formal demographic analysis since it is the "standard" but included the latter as well (10–45 years) in some calculations since so many Shipibo mothers were younger than 15.

In order to define the distribution of polygynous relationships and polygynous birth intervals, I constructed three definitions of polygynous effect: (1) classification of a woman according to whether she had been in a polygynous marital relationship at any time; (2) classification of a particular birth interval according to whether it had occurred in the context of a polygynous relationship; and (3) the proportion of each woman's birth intervals that were polygynous, expressed as a value between 0.00 (all monogamous intervals) and 1.00 (all polygynous intervals). I also assigned each individual and family to one of the following categories: patrilocal, matrilocal, avunculocal, neolocal, bilocal, or sorolocal (with reference to the woman's sister). Finally, I numbered each community according to the order of study and its distance from Pucallpa, the largest and most important source of cultural change. The first village studied (Charashmanan) was also the most remote.

results

A total of 1445 individuals were enumerated in *de jure* censuses⁶ of all eight villages. Of these, 585, or more than one-third, were located in Paoyhän, a recent offshoot of the older settlement of Paococha. The total population had a sex ratio of 104; nearly half (49.3 percent) were under 15 years of age, and 60.3 percent were under 20 (Hern 1988; see Figure 2).

polygyny Of the 386 females aged 13 or older, 75 (19.4 percent) reported having participated in a polygynous union at one time or another. Of these, 50 women (13 percent of the total), including some who were under 15 or over 45, were in polygynous unions at the time of the interview. As Table 1 shows, 45 (15.7 percent) of the women ages 15 through 45 were currently in polygynous unions, with the highest proportions in the Pisqui villages of 9 de Octubre (45.5 percent), Vencedor, Tupac Amaru, and Charashmanan.

Table 2 shows the proportion of polygynous birth intervals,⁷ with the highest occurring in Tupac Amaru at 56.6 percent. Irazola and Santa Rosa are anomalous Pisqui communities with a rather low proportion of polygynous birth intervals. Paoyhän, on the Ucayali, has the lowest proportion, whereas Paococha, also on the Ucayali, has a higher proportion than two Pisqui communities.

Table 3 details the cumulative proportions of polygynous birth intervals by community. The highest proportion (.523) is found in Vencedor, on the Pisqui, and the lowest (.067) in Irazola, also on the Pisqui. A one-way analysis of variance comparing cumulative proportions of polygynous birth intervals showed a statistically significant difference among villages ($F = 8.7$; $p = 0$; see Table 4). Kendall's Tau *B* test (Siegel 1956:213–223) for correlation between village

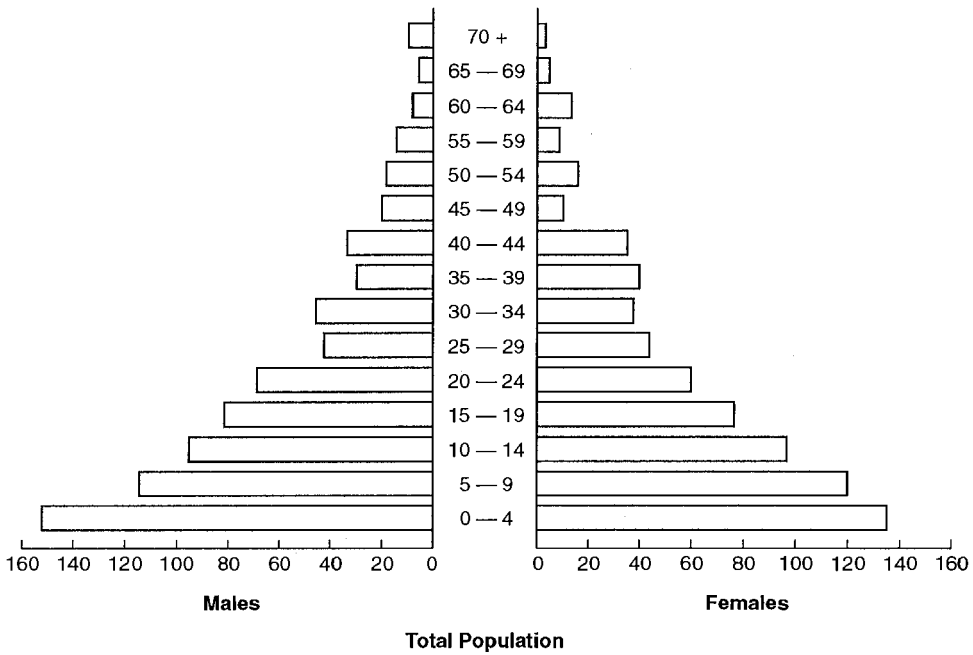


Figure 2. Total population by age.

Table 1. Women of reproductive age by type of marital union.

Village	Monogamous		Polygynous	
	No.	%	No.	%
Charashmanan	31	72.1	12	27.9
Vencedor	20	69.0	9	31.0
Tupac Amaru	17	68.0	8	32.0
Irazola	16	88.9	2	11.1
Santa Rosa	25	100.0	0	0.0
9 de Octubre	6	54.5	5	45.5
Paococha	29	85.3	5	14.7
Paoyhän	98	96.1	4	3.9
Total	242	84.3	45	15.7

location and the cumulative proportion of polygynous birth intervals confirmed the field observation that polygyny was concentrated in the villages farthest from Pucallpa, the major regional source of cultural change ($Tau B = -.28571$). The high prevalence of polygyny documented in the Pisqui village was consistent with anecdotal reports and with Abelow's observations in 1974 (1978).

patrilocality As shown in Table 5, 67.6 percent of all individuals lived in a matrilineal household while 13.6 percent lived in a patrilineal one. Of married individuals aged 13 or older, 64.1 percent were members of a union that was matrilineal in residence, and 22.4 percent lived in one that was patrilineal (see Table 6).

A chi-square test of the relationship between polygyny and patrilocality/matrilocality, excluding other residence types, showed that the proportion of polygynously married individuals

Table 2. Prevalence of polygynous birth intervals.

Village	Polygynous		Monogamous	
	No.	%	No.	%
Charashmanan	103	52.0	95	48.0
Vencedor	48	51.6	45	48.4
Tupac Amaru	64	56.6	49	43.4
Irazola	11	12.6	76	87.4
Santa Rosa	20	16.9	98	83.1
9 de Octubre	29	52.7	26	47.3
Paococha	45	25.9	129	74.1
Paoyhän	28	5.3	497	94.7
Total	348	25.5	1015	74.5

Table 3. General Fertility Rates and cumulative proportions of polygynous birth intervals.

Village	General Fertility Rate	Proportion of polygynous birth intervals
Charashmanan	.255	.433
Vencedor	.148	.523
Tupac Amaru	.217	.455
Irazola	.353	.067
Santa Rosa	.400	.080
9 de Octubre	.182	.500
Paococha	.378	.201
Paoyhän	.271	.070
All villages	.278	.224

Table 4. One-way analysis of variance.

By	Variable	PROPORTION OF POLYGYNOUS INTERVALS				
		SITE	(Village location)			
Analysis of Variance						
Source	df	Sum of squares	Mean ratio	F	p	
Between groups	7	8.3282	1.1897	8.7366	0.0	
Within groups	227	30.9126	.1362			
Total	234	39.2408				

Table 5. Residence by locality of household.

Locality of household	Females		Males		Total	
	No.	%	No.	%	No.	%
Unknown	11	.8	7	.5	18	1.2
Patrilocal	94	6.5	103	7.1	197	13.6
Matrilocal	475	32.9	502	34.7	977	67.6
Neolocal	103	7.1	106	7.3	209	14.5
Bilocal	14	1.0	10	.7	24	1.7
Avunculocal	1	.1	2	.1	3	.2
Sorolocal	10	.7	7	.5	17	1.2
Total	708	49.1	737	50.9	1445	100.0

living patrilocally was higher than expected (see Table 7). The distributions were similar for both married males and married females, but the fact that higher than expected proportions were living patrilocally did not reach statistical significance (Table 8 and 9). There was no evidence that minor differences in age structures of the villages had any correlation with differences in the prevalences of polygyny or patrilocality.

Monogamous couples tended to have relatively variable residence patterns, including the neolocal, bilocal, avunculocal, and sorolocal, whereas strongly polygynous unions were likely

Table 6. Residence by locality of couple (all married individuals aged 13 or older).

Locality of couple	Females		Males		Total	
	No.	%	No.	%	No.	%
Patrilocal	68	11.9	60	10.5	128	22.4
Matrilocal	195	34.0	173	30.1	368	64.1
Neolocal	18	3.1	16	2.8	34	5.9
Bilocal	15	2.6	15	2.6	30	5.2
Avunculocal	3	.5	3	.5	6	1.0
Sorolocal	4	.7	4	.7	8	1.4
Total	303	52.8	271	47.2	574	100.0

Table 7. Patrilocality/matrilocality by marital status of married individuals.

Marital status	Patrilocal		Matrilocal		Total	
	No.	%	No.	%	No.	%
Monogamous	98	19.8	311	62.7	409	82.5
Polygynous	30	6.0	57	11.5	87	17.5
Total	128	25.8	368	74.2	496	100.0

Chi-square = 4.14814; $p = 0.0417$.

Table 8. Patrilocality/matrilocality by marital status of married females aged 13 or older.

Marital status	Patrilocal		Matrilocal	
	No.	%	No.	%
Monogamous	49	18.6	158	60.1
Polygynous	19	7.2	37	14.1

Chi-square = 2.4189; $p = 0.1199$, n.s.

Table 9. Patrilocality/matrilocality by marital status of married males aged 13 or older.

Marital status	Patrilocal		Matrilocal	
	No.	%	No.	%
Monogamous	49	21.0	153	65.7
Polygynous	11	4.7	20	8.6

Chi-square = 1.77156; $p = 0.1832$, n.s.

to be either patrilocal or matrilocal, with a greater proportion of patrilocality among the polygynous than among the monogamous couples. Overall, the Shipibo I studied were strongly matrilocal, but the polygynous ones were somewhat less so. There was generally a greater degree of patrilocality in highly polygynous villages.

polygyny and fertility As reported in detail elsewhere (Hern 1992), mean birth interval lengths were significantly longer for polygynous women (34.5 months) than for monogamous women (30.3 months) ($p < 0.02$), and polygynous women had lower individual fertility than monogamous women (Hern 1990). Fertility was not particularly related to the woman's age when she first gave birth, nor were birth interval lengths much affected by the woman's age, the interval number, birth order (Bean and Mineau 1986; Hern 1988, 1992), or village location.

At the community level, the strongest negative correlation between the cumulative proportion of polygynous birth intervals and any fertility variable was that with the General Fertility Rate (see Table 3).⁸ A regression scatterplot of General Fertility Rate with the cumulative proportions of polygynous birth intervals by village (see Figure 3) yielded a strong negative correlation between polygyny and fertility ($r = -0.84515$), even though Paoyhän was something of an outlier. The adjusted R square was 0.6667 (see Table 10), with $F = 15$ ($p < 0.01$).

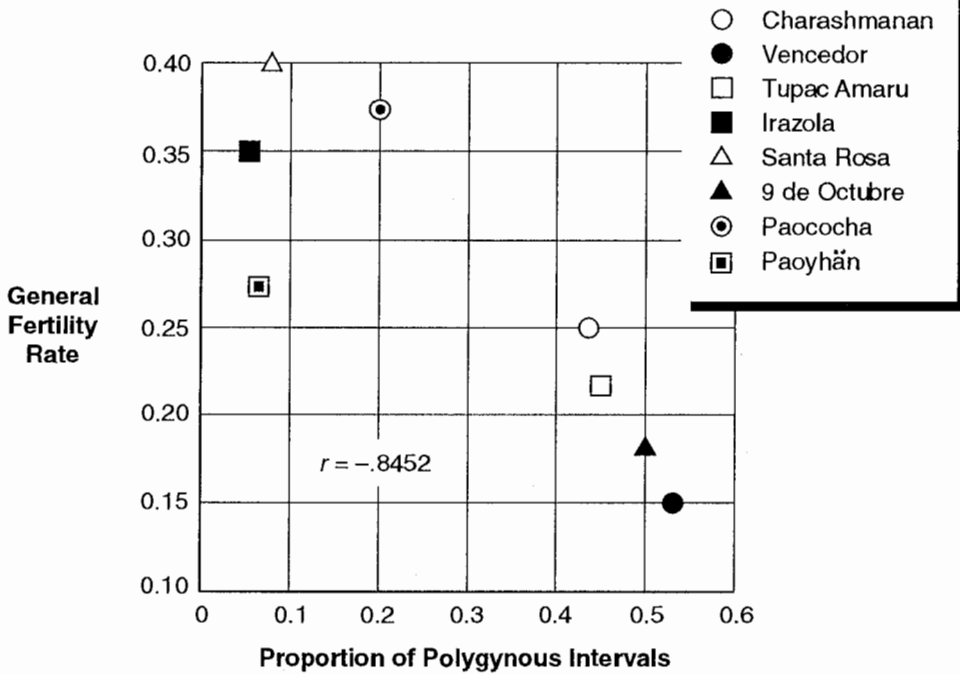


Figure 3. Regression scattergram of General Fertility Rate (dependent variable) versus proportion of polygynous birth intervals (independent variable).

Table 10. Regression of proportion of polygynous birth intervals on the General Fertility Rate for eight Shipibo villages.

Multiple R	.84515				
R Square	.71428				
Adjusted R Square	.66666				
Standard Error	.05384				
Analysis of Variance					
	df		Sum of Squares		Mean Square
Regression	1		.04348		.04348
Residual	6		.01739		.00290
F =	14.99944	Signif F =	.0082		
Equation Number 1					
Variable	B	SE B	Beta	T	Sig T
PROPOLY	-.38314	.09893	-.84515	-3.873	.0082
(constant)	.38704	.03452		11.211	.0000

discussion

Examining the prevalences of polygyny and residence patterns is fraught with some hazards, for relationships are fluid and anthropological definitions do not always fit local realities. On the other hand, some stable relationships are easy to characterize as monogamous or polygynous, and most unilocal residence classifications are obvious.

Among the Shipibo Indians of the Peruvian Amazon basin, the decline of polygyny appears to be related to increases in fertility. Polygyny is an important biocultural adaptation that facilitates not only prolonged postpartum sexual abstinence for lactating females but also prolonged postpartum lactation amenorrhea. I argue that modernization, as measured by changes in fam-

ily structure, increases fertility in a tribal society by disrupting traditional fertility control mechanisms. Shipibo Indian women in polygynous unions have longer birth intervals and lower fertility than women in monogamous unions, and Shipibo communities in which polygyny is more prevalent have lower community fertility rates than those in which it is less prevalent. Changes in residence patterns accompany changes in family structure, but this is a secondary, noncausal association.

My inferences of causality rest on the following observational hypotheses:

1. Polygyny is more prevalent in traditional Shipibo villages than in relatively acculturated communities; in fact, a high prevalence of polygyny is evidence of a high degree of traditionality.
2. Polygyny is a traditional Shipibo family structure, and it is more likely to be found in a traditional than in a nontraditional community; therefore, more extensive cultural change (modernization) can be assumed to have occurred in communities with lower prevalences of polygyny.
3. Polygyny is vitally linked with individual and community fertility since it strongly influences the degree to which traditional postpartum sexual abstinence will be observed, and it consequently results in longer birth intervals.
4. Women living in polygynous unions give birth less often than do women in monogamous unions.

Polygyny may be seen as one indication of community traditionality, since cultural or social structural change is unidirectional in the case of this particular cultural trait: it is apparent that Shipibo communities are becoming less, not more, polygynous and less, not more, traditional.

An overall causal model diagram is given in Figure 4. While it is inspired principally by Greenland and Neutra (1980), it takes some guidance from Margalef (1968) since it shows a *positive feedback loop*, at least at the present time. It does so because increased fertility leading to increased population growth is currently resulting in an increasingly rapid rate of modernizing cultural change in the Amazon basin. Modernization is seen entering, stage left, as an important *destabilizing* independent variable increasing both fertility and, for a time, mortality. The ecological consequences for the Amazon basin are highly significant, in terms both of future demographic relationships and of the regional ecosystem, but they are beyond the scope of this article.

A declining prevalence of polygyny is evidence of cultural change, and of "modernization" in particular, but it is only one such indication. Nonetheless, Shipibo culture appears to be moving principally in one direction—namely, toward the adoption of Western cultural technology and values and not toward the abandonment of Western culture. The Shipibo are not becoming more Shipibo; they are becoming more and more difficult to distinguish, at times, from their mestizo neighbors. In some cases the only significant distinction remaining is the ability to speak Shipibo.

Polygyny as an institution is declining among the Shipibo. Shipibo are increasingly aware of their image among non-Shipibo and do not wish to appear to be *salvajes*; they wish to appear to be *civilizado*, which means giving up Shipibo customs such as polygyny, face painting, and cranial deformation. During the past few years, Protestant missionaries in particular have developed strong ties and influence in the Shipibo communities under study. According to certain Shipibo informants, the missionaries have made the Shipibo feel ashamed of some of their customs, especially polygyny.

In the villages studied in preparation for this article, both polygyny and patrilocality tended to be concentrated in communities on the Pisqui River, which are much more isolated from Western cultural influences than the two communities on the Ucayali. Paradoxically, one of the Pisqui villages is just across the river from a large mestizo *estancia* (cattle ranch), which is an increasing source of proximate Western contact for the Pisqui Shipibo. At the time of the

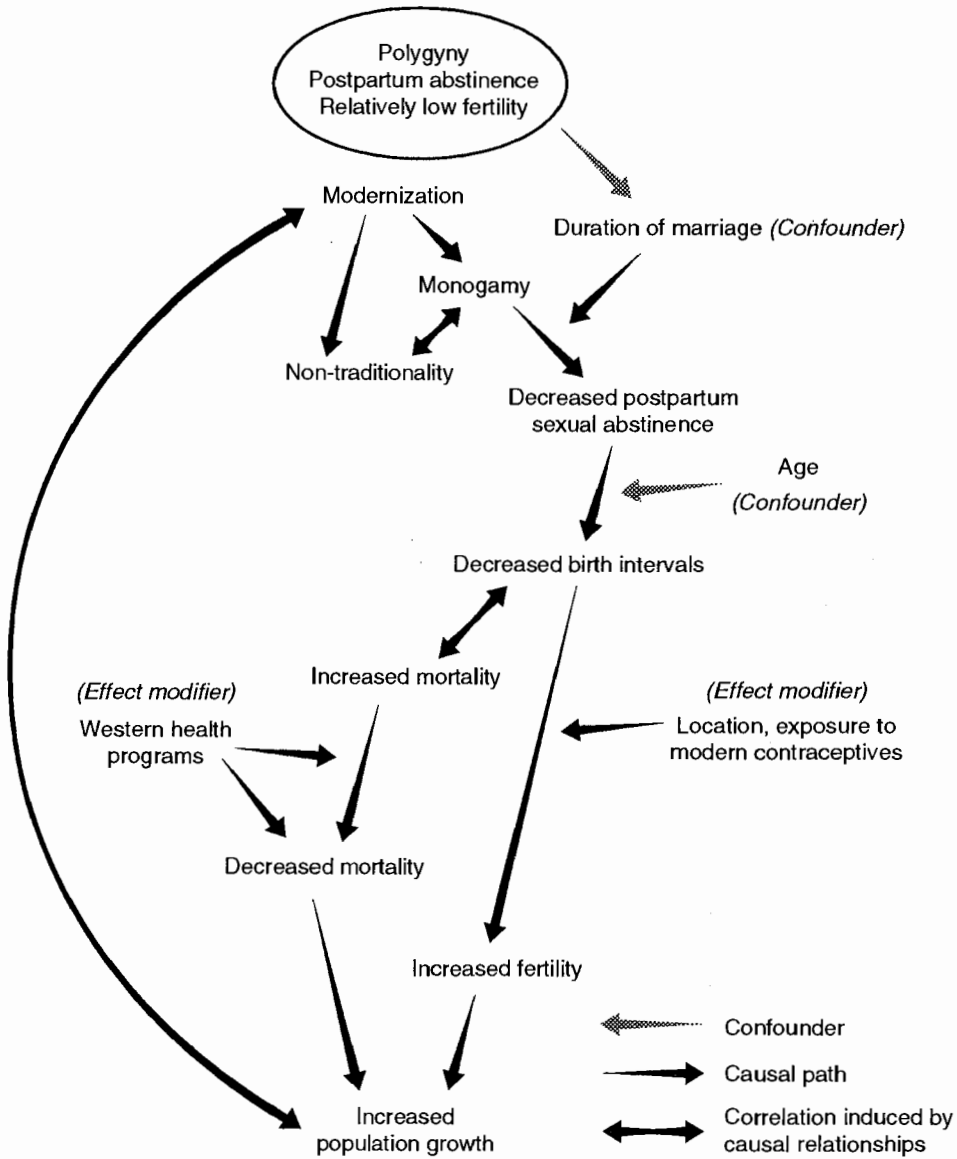


Figure 4. Positive feedback loop.

study, this village and its neighbor just up the river were the only Shipibo settlements on the Pisqui with no evidence of current polygynous unions. A comparison of my data with Behrens' (1984) indicates that the Shipibo village at the farthest reach of the Pisqui had one of the lowest prevalences of polygyny. This village was not included in my study, but while it was the most distant, it was not the most isolated; it had a health post and a landing strip and was frequently visited by outsiders. Indeed, the Pisqui Shipibo settlement closest to the Ucayali (9 de Octubre) was the smallest and one of the most conservative; the majority of women in the community were in polygynous unions. There are several possible but unsatisfactory explanations for this phenomenon. Too small to serve as a supply station for most mestizo river travelers, 9 de Octubre had had correspondingly less exposure to cultural change, although this appeared to be

changing during the period of observation. Its small size weighed against cultural change; by all accounts, it was and is a more "typical" Shipibo settlement, and its inhabitants had and continue to have an extremely conservative outlook. Finally, it was apparently settled fairly recently by immigrants from the upper Pisqui, one of the most remote and, in most sections, culturally conservative parts of the Shipibo culture area.

In general, the farther from Pucallpa and from the largest village, Paoyhän, the higher was the prevalence of polygyny by any measure; Paoyhän, closest to Pucallpa, had the lowest prevalence, and it was and is the most acculturated village in Western terms. Paococha, the remnant of the original village, had a much higher prevalence of polygyny than its large Ucayali neighbor just up the river, in part because Paococha retained the bulk of the original "traditional" family that had moved into the village in the mid-1960s and in part because it retained a conservative outlook as well. The nucleus of Paoyhän settlers were the more acculturated long-time residents of Paococha who tended to look down on their traditional brethren who had stayed in Paococha.

Some young people today are establishing polygynous unions, but it is likely that the prevalences of polygyny in Pisqui communities will drop markedly during the next generation. Large numbers of mestizo families are colonizing the Pisqui and bringing with them more Western contact. The loss of polygyny is likely to be associated with important changes in Shipibo culture and demography alike. Long-term studies of polygyny, residence patterns, and fertility may help us understand the pace and effects of such cultural changes.

The complex relationships among fertility, mortality, and cultural change are difficult to untangle. Studying the Shipibo offers us the opportunity to see a real social and human ecological system in action and in the process of change. We can perceive and perhaps even document a plausible biological link between certain permanent features of the Shipibo social system and the group's fertility. We can identify certain facts even though we may have difficulty specifying their exact limits and features:

1. The Shipibo have had polygynous family structures to some degree or another since the earliest recorded Western contacts with them.
2. Polygyny is important enough to the Shipibo to have prompted violent reprisals against those who discouraged the custom.
3. The Shipibo share this social structural feature with a wide variety of lowland South American Indian tribes, some of them, other Panoan groups, with close linguistic ties to the Shipibo.
4. Polygyny is almost universally linked with postpartum sexual abstinence, lactation amenorrhea, and long birth intervals.
5. Among preindustrial groups, long birth intervals are closely and causally related to low fertility, enhanced child survival, and lower maternal mortality (De Sweener 1984; Wolfers and Scrimshaw 1975; Yerushalmy 1945).
6. Polygyny as a family structure is not increasing anywhere in the world; on the contrary, its gradual diminution is evidence of cultural change, even "modernization" (J. Caldwell 1982:289). In fact, cultural change is occurring so rapidly that the phenomena under study here will possibly be a matter of history within a generation or two.
7. Fertility among the Shipibo, at both the community and the tribal level, appears to be exceedingly high.

I am making several simplifying assumptions⁹ here: first, that polygynous status and its influence on both birth interval length and individual fertility can be measured with enough validity, reliability, and precision to allow us to draw conclusions from the results; second, that the cumulative effects of these fertility-influencing factors on the community are valid, can be measured with reliability and precision, and may be causally related;¹⁰ and third, that influences

such as the environment and cultural change are operating in a uniform manner on all of the populations under study.

The mean birth interval length for polygynous women is only four months longer than that for monogamous women. Potter, Gordon, Parker, and Wyon (1965) indicate that mean birth intervals of more than 30 months reflect a mean length of postpartum amenorrhea of nearly a year and are presumably evidence of lengthy breastfeeding. It is difficult to tell whether this four-month difference can account for differences in fertility between polygynous and monogamous women. Bongaarts (1981), however, showed that even moderate declines in the postpartum nonsusceptible period of nine months among the Yoruba would produce increases of over 32 percent in marital fertility. Shipibo women nurse their children for from one to three years, but with variable intensity. Shipibo infants are slung on the hip and kept there virtually until they can walk, and during that time they nurse on demand. I was unable to observe whether the nursing practices of polygynous women differed from those of their monogamous peers.

conclusion

Among the Shipibo, polygyny, which is chiefly sororal, is strongly correlated with unilocal residence. But while most marital residences are matrilocal, polygynous ones are somewhat more likely to be patrilocal than are monogamous ones. Polygyny is correlated with long birth intervals and negatively correlated with fertility in every respect. All community and cumulative individual fertility measures are influenced by the prevalence of polygyny in the community, but the most global measure, the General Fertility Rate, has the most striking and statistically significant negative association with the cumulative community index of polygyny, the proportion of polygynous birth intervals. If any prediction can be made on the basis of the present study, it is that the major increases in fertility among most of the Shipibo communities studied may still be ahead. As a microcosm of rapid cultural change in a tribal society, the Shipibo suggest much of our past and give us much to ponder for the future. The idea that the rate of human population growth will somehow miraculously decrease in the future as tribal and peasant societies enter the modern world is not supported by this study.

notes

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¹"Birth interval" refers to the length of time from one birth to the next, whether the births are live births or stillbirths. It does not include early miscarriages or abortions. A "closed" birth interval is one that is bounded by a birth on each end; an "open" interval is one that is bounded by the last birth and the moment of observation. A "mean closed birth interval length" would be the average length of closed birth intervals for an individual woman or group of women. All birth interval lengths used for calculations in this study were closed ones.

²"Prevalence" is an epidemiological term meaning the number of people who have a condition at a certain point or period in time, or, more generally, the number of cases or occurrences of a phenomenon that are found in a community at a certain time.

³"Total Fertility Rate" is the term used for the sum of the age-specific birth rates (the birth rate for each age group of women in a particular year). It adjusts the result according to the number of women in each age category and permits comparison among groups of widely different age structures. A Total Fertility Rate of 2, for example, means that the average woman has two term births during her reproductive life. A Total Fertility Rate of 2 also happens to be, generally speaking, "replacement level" fertility.

⁴Polygyny is operationally defined as the simultaneous, not the serial, cohabitation of more than one woman with one man, cohabitation meaning periodic sexual relations in a recognized marriage relationship. I calculated the time spent in polygynous unions, not just the number of women who participated in such unions. Relative time spent in a polygynous union was determined by characterizing each birth interval according to whether it occurred in a polygynous relationship or not.

⁵A "proxy control variable" is one that serves as a close and reasonably accurate substitute for a "control variable" that is inaccessible. A "control variable" is a characteristic that determines another characteristic or result, as distinguished from a "dependent" variable, the result. In this case, the "dependent" variable is either *fertility* or *birth interval length*, depending on the level of analysis. The "control variable" is *postpartum sexual abstinence*, which determines the risk of pregnancy and, thus, fertility and/or birth interval length. Since actual sexual activity cannot be observed and reports are unreliable, *polygynous status*, which is strongly associated with postpartum sexual abstinence, is the "proxy" for the "real" control variable, postpartum sexual abstinence.

⁶A de jure census counts all those who are legally part of a community whether or not they are present; a de facto census counts only those who are present at the actual time of the census.

⁷The "proportion of polygynous birth intervals" is the simple arithmetic ratio between the number of polygynous birth intervals a woman has had and the total number of birth intervals. If she has had 11 children, there have been ten closed birth intervals. If she is the senior wife in a polygynous marriage and her husband did not take his second wife until the first wife had had three children, only eight of the birth intervals occurred in a polygynous marriage. The proportion of polygynous birth intervals experienced by this woman, then, is $8/10 = 0.8$. The proportion experienced by a monogamous woman would be $x/x = 1.0$. The cumulative proportion of polygynous birth intervals is the sum of all proportions. A cumulative proportion of 0.5 for a community means that half of all birth intervals occurring in the community take place in a polygynous relationship; it is an accurate reflection of the community prevalence of polygyny. Table 2 shows the proportionate number of polygynous birth intervals in a community (56.6 percent of all recorded birth intervals in Tupac Amaru, for example, have been polygynous). Table 3 shows the average proportion of polygynous birth intervals for all women in each community, a number reached by adding all proportions and dividing by the number of women.

⁸"General Fertility Rate" refers to the ratio of the number of live births to the number of females in the reproductive age range (15–45 years) for a particular population in a given year.

⁹Pointing out that "the basic dilemma faced in all the sciences is that of how much to oversimplify reality," Blalock noted that putatively causal relationships (between the variables of interest) cannot be evaluated unless we make simplifying assumptions about other variables (1964:8, 13).

¹⁰John Cassel (1964) encouraged the use of social science theory as a source of epidemiologic hypotheses, although he may not have envisioned the application of this principle in quite this context. Popper (1968) emphasized the formulation of research in terms of the testing of refutable hypotheses, a principle that has guided my endeavor.

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