# TRACTORS AND TRANSACTORS: SOME POSSIBLE INFRASTRUCTURAL REASONS FOR THE AMBIVALENT ATTITUDES OF MALES TOWARD FEMALES IN THE NEW GUINEA HIGHLANDS

by

David Black
McMaster University

## ABSTRACT

This paper attempts to establish a causal relationship between infrastructural factors and the ambivalent attitudes displayed by men toward women in Highlands New Guinea societies. Factors are delineated which contribute to the value of women on one hand, and to the danger of, the low status of, and the need to control, women, on the other. Divale and Harris' (1976) model of a population, warfare, male supremacist complex is used as an explanatory device, and its usefulness is evaluated in light of Highlands ethnographic data. Divale and Harris' use of sex ratio data as a key indicator for their model is criticised. An alternative formulation of their model has been proposed which provides a better fit to Highlands ethnographic data, by proposing a causal link between male preoccupation with warfare, female labour contribution to subsistence, and the need for birth spacing. This network of variables provides an option for the causal network suggested by Divale and Harris involving female infanticide and unbalanced sex ratios.

## RESUME

Dans cet article l'auteur essaye d'établir une relation de cause entre les facteurs infrastructurels et les attitudes ambivalentes manifestés par les hommes envers les femmes dans les sociétés des hautes-terres de la Nouvelle-Guinée. Des facteurs qui contribuent à la valeur de la femme, à son danger potentiel dans la société, à son rang social inférieur, et le besoin de la controler, sont décrits. Le modèle Divale et Harris (1976) de population, guerre, comme un complexe de suprémacie male est employé comme moyen explicatif, et son utilité est evalué en ce qui concerne les relevés ethnographiques des hautes-terres. L'emploi des données de proportions des deux sexes dans la population comme indicateurs clef pour ce modèle, est critiqué. Une autre formulation de ce modèle est suggéré; celle-ci fournit un meilleur cadre d'analyse pour les données ethnographiques, en suggérant une liason entre la préoccupation des hommes avec la guerre, la contribution des travaux pour la subsistance par les femmes, et le besoin d'intervalles entre les naissances. Ce réseau de variables fournit une option pour le réseau causatif suggéré par Divale et Harris implicant les infanticides d'individus de sexe feminin et les proportions déséquilibrées des deux sexes dans la population.

## AN HYPOTHESIS:
## VIOLENCE, AMBIVALENCE, AND INFRASTRUCTURAL CAUSATION

Several anthropologists working in the area have noted that, in general, intersexual relationships in the New Guinea Highlands tend to be characterised by a marked degree of hostility and tension (Read 1952, 1954; Langness 1967:162; Meggitt 1964:202; Berndt 1962). In some cases, for instance Berndt's account of Fore society, this intersexual aggression and violence seems to be extreme, while in other cases it is of a lesser intensity. In spite of the variations, this generalization seems to hold true, to some extent, for all of the Highland New Guinea societies studied to date. The form which this aggression takes is that of acts of violence, or behavioral restrictions, directed against women by men. This correlates with the generally low status position which women occupy in Highlands societies.

This characterisation of violent relationships between the sexes may be overstated in the literature. The hostility is obviously restricted to specific situations, and men and women form lasting relationships in spite of these situations. If this were not so these groups would be hard pressed to maintain their population size -- however, in functional terms, one of the results of intersexual antagonism may be to produce adaptively low population growth rates. Some ethnographers (Langness 1967:172-73; Read 1952; Meggitt 1964:210; Meigs 1977; Waddell 1972) have noted that Highlands men display very ambivalent attitudes toward women, and are much concerned with both maintaining social control of women and with protecting themselves against the power of women. The aggression of intersexual relationships may relate to this perceived need for control and protection. The ambivalence on the part of Highlands men seems to result from a recognition that women are, on one hand, dangerous, inherently powerful, and yet inferior, and, on the other hand, are very valuable. Ambivalence seems to me to be a more useful general characterisation for intersexual relationships in the Highlands than hostility, and it is toward the causes of this ambivalence that I will address myself here.

This paper is intended to explore the causes of ambivalence from a materialistic point of view. The overall research strategy has been drawn from the suggestions of Harris (1979). The research is, thus, oriented by the notion that the types of intersexual relationships discussed above may be correlated with, and, indeed, may be causally linked to certain infrastructural conditions that are also generally characteristic of Highlands societies and ecologies. Since male-female aggression and hostility are often couched in explicitly sexual terms, or are the result of sexual behavior (Berndt 1962; Meggitt 1964:204; Langness 1967:162; Rohaytynskyj 1978), the approach was also colored by the assumption that these hypothetical infrastructural conditions would be most directly concerned with reproduction and less directly concerned with production. The terms in which relevant variables are discussed are general rather than specific.

The question then can be asked, why are women seen as powerful, valuable, and dangerous, and why is there a preoccupation with the control of their power? Several reasons have been put forth in the literature as to why men may regard women ambivalently.

The high value of women in Highlands societies is a constant, and derives from their relatively important and energetic role in subsistence activities, their role as domestics, the fact that unmarried men in the Highlands are virtually always of lower status than married men, their desirability as sex objects, and from their role in reproduction.

The danger and 'bad' power (Rohaytynskyj 1978) embodied by women is a theme which seems to be ubiquitous in Highlands mythology and rituals. This danger and power is partially defined in terms of female sexulaity as is the value of women. Men seem to be taught from their earliest childhood to both desire and fear women. Ambivalence toward women may derive from the fact that, in may cases, women marry out of the social group into which they are born. As a result, they may be regarded as less desirable than males as offspring. Males generally remain with their natal group throughout their lives.

In the case of groups like the Mae Enga (Meggitt 1965, 1977; Waddell 1972:25) the ambivalence may exist because women marry into the group from enemy groups. Here, I am referring to groups like the Mae that marry those with whom they fight. Thus, women may represent a route by which strategic information may pass into the hands of an enemy. Men may fear that their wives could be pressured by their fathers and brothers into betraying their husband's group. This, however, is not a universal situation in Highlands societies.

I would not dispute the veracity of these types of causal factors in creating men's ambivalence toward women. However, in this paper, I would like to put forth another, possibly more general, explanation for these ambivalent and hostile relationships. I suggest that women may be seen as powerful because of their reproductive capacity. In addition, socio-ecological conditions may occur (for example, demographic pressure on essential resources) which would render excessive reproduction undesirable and maladaptive, so that the reproductive capacity of women may be seen as dangerous. Thus, the need to control women could, in fact, be seen as a need to control the reproductive capacity of women. The hostility between the sexes would stem from frustrations resulting from obstacles placed in the way of sexual expression as has been suggested by Langness (1967:174).

The balance of this paper will be an attempt to substantiate and evaluate variables impinging on the hypothesis I have presented above. It should be noted at this time that data relevant to this problem proved to be scarce in the literature, and that the data available was often of dubious quality. As a result the discussion below is conducted at a rather more theoretical level than would be ideally desirable. Some data has been drawn from outside the Highlands culture area proper, but in all cases the data has been drawn from ethnographies dealing with mainland New Guinea societies.

## A MODEL:
## POPULATION PRESSURE, WARFARE, AND MALE SUPREMACY

One of the indirect purposes of this discussion is to test the applicability of the Divale/Harris model of a male supremacist complex (Divale and Harris 1976) to the New Guinea Highlands area.

This model was designed to explain the occurrence of certain variables in relation to male supremacy in band and village socio-cultural systems from an explicitly materialistic point of view. I believe that a discussion of this model will assist in delineating variables relevant to the problem at hand, whether or not the model is found to be rigidly applicable in the case of Highlands societies.

The form and operation of the Divale/Harris model is outlined very briefly here (see Divale and Harris 1976, and Harris 1979:89-92, for a complete description). The model was suggested by the formative research of Ember (1974) into an observed correlation between warfare, polygyny, and unbalanced sex ratios. Harris and Divale have extended the scope of their model to include other aspects of the socio-cultural system. In particular, they see this system as an explanation of male supremacist behavior.

Figure 1 is a diagram of the interaction of those variables in the model which are most directly relevant to the problem of male-female relationships. In this diagram, an addition sign indicates that the value of the first variable increases the value of the next variable; a subtraction sign indicates that the value of the first variable decreases the value of the second variable. Estimations of intensity and value inherent in the model are virtually all subjective and qualitative.

Briefly stated, Divale and Harris have argued that the need to regulate population growth and population distribution is causally related to warfare and to female infanticide. Female infanticide regulates population growth by minimising the number of women reared to reproductive age, and results in high male to female sex ratios among children and young adolescents.

Warfare contributes causally to female infanticide by encouraging the rearing of males as warriors; moreover, because it results in male deaths in late adolescence and adulthood, warfare increases the intensity of polygyny. Male deaths also create a different set of sex ratios in the adult segment of the population than among children and young adolescents. In the former group there will be fewer males per female, and in cases of extreme warfare, women may come to outnumber men. Polygyny is seen to persist as a means of rewarding warriors who are especially skillful and valorous -- these being the men who are able to acquire several wives. To further reinforce polygyny as a reward, women in societies influenced by this complex may assume an inordinately large role in production, and thus, be more economically valuable.

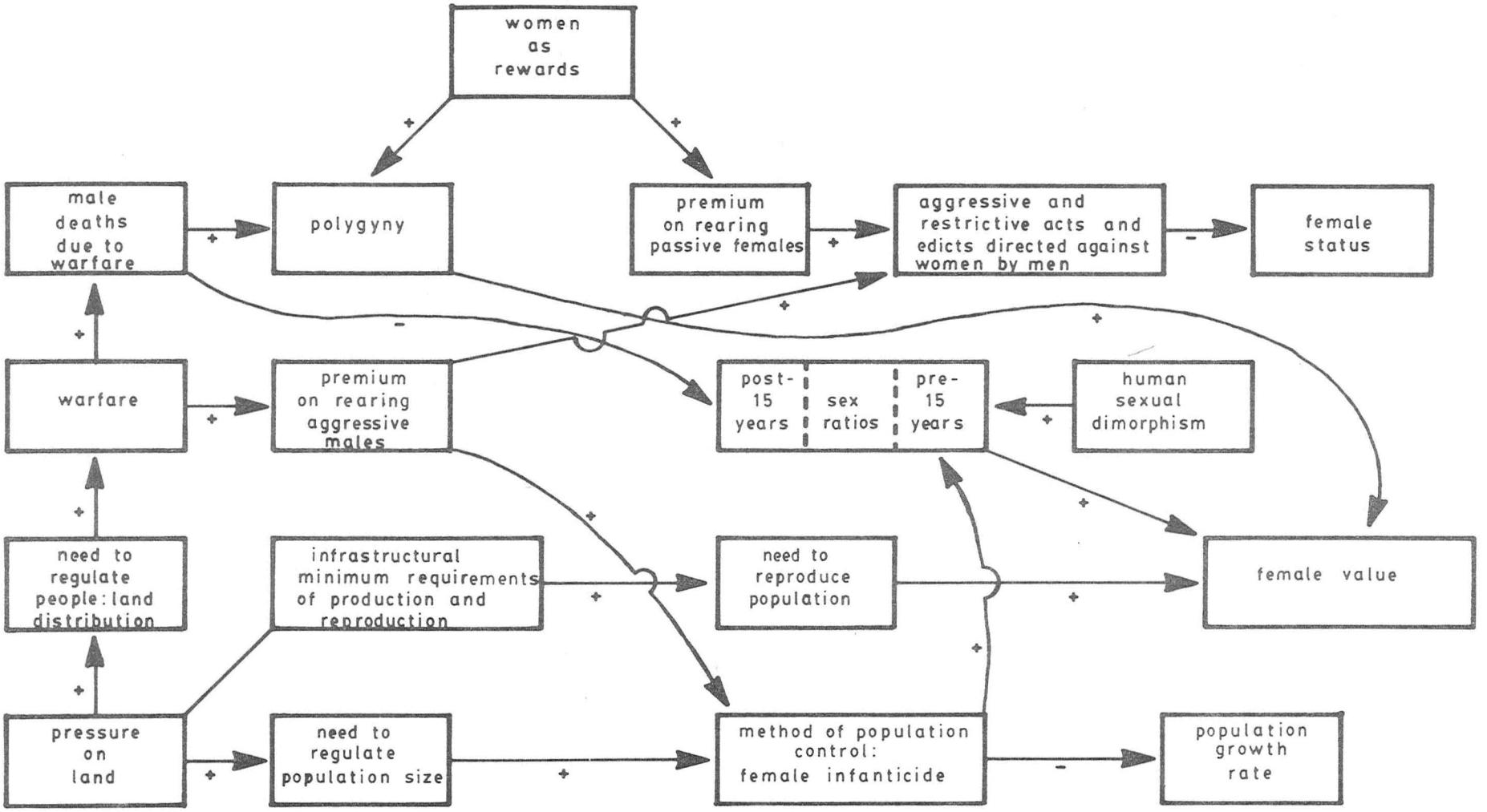


FIGURE 1: POPULATION, WARFARE, AND MALE SUPREMACY (Divale and Harris: 1976).

Several results are effected by this system. First, population is dispersed and redispersed over land as a result of warfare. Second, male supremacy, as Harris and Divale have argued, can be seen as part of an adaptive mechanism leading to lower population growth rates. Finally, and more important for our purposes here, a premium can be seen to be placed on the rearing of powerless (and possibly passive) women, and on maintaining them in a low social status position. A relationship can be demonstrated between factors contributing to the high value of women (their roles in production, reproduction, as status and sex objects) and factors which lead to the low status of women (the premium on raising aggressive males, and the role of women in a reward system for male warriors).

As a result of the rearing of aggressive males, and powerless, or passive females, one would expect a high degree of aggressive acts and edicts directed by men against women in societies where this system is operating. At the same time one would expect a concern on the part of men with maintaining social control over women. This is the essence of the male supremacist aspects of the model.

One of the problems with the type of model that Divale and Harris have presented is that as one perfects this type of systems approach, it becomes more and more difficult to posit an independent variable that is capable of 'driving' or 'kicking' the causal mechanism into operation (Maruyama 1968). In other words, while it is easy to see how the system might operate synchronically, it is difficult to imagine how it might have developed diachronically, or which variable is the ultimate cause of the system. Divale and Harris identify prestate warfare as the most important cause of the complex, but go on to state that warfare is a result of the need to regulate population growth, and to redistribute persons and groups of persons over units of territory. Both of these latter two variables can be linked to demographic pressure on land. For our purposes here, it will be assumed that pressure on land is the ultimate driving force behind the system.

The literature on agricultural systems, carrying capacity, agricultural intensity, and the relationship between intensive agricultural practices and population density in the New Guinea Highlands is volumnous (see, for instance, Brookfield and Hart 1971; Clarke 1966, 1971; Brookfield and Brown 1959; Waddell 1972, 1973; Rappaport 1967). A review of this literature is beyond the scope of the present paper. Instead, it will be assumed here, that, in general, some degree of pressure on land is characteristic of most Highlands socio-ecological systems, and that any consideration of whether this pressure can be, or is, emically or etically defined is irrelevant to the role that this variable might play in driving a system like the one described above. In defence of this assumption it should be pointed out that the existence of dense population concentrations, intensive agricultural practices, and intensive warfare in the Highlands would seem to be diagnostic of some sort of pressure on land, although the mechanics of this correlation have proven to be very difficult to determine (Brookfield and Hart 1971:94-100).

Divale and Harris have also speculated that the beginning of this system may be correlated to changes from high to low protein diets (1976:532). This is an interesting speculation in the present case since one of the major theories involving the development of the present socio-ecological situation in the Highlands posits a change from high to low protein diets and a rapid increase in population densities and agricultural intensity as a result of the introduction of sweet potatoes to the Highlands about 400 years ago (Brookfield and Hart 1971; Watson 1965). It should also be pointed out that pressure on land is not just a result of total land scarcity, but also of uneven population distribution (Kelly 1968:37). This is an especially important consideration in rainforest ecosystems where concentrations of population cause environmental degradation very rapidly (see, for example, Clarke 1966:357).

At first perusal the Divale/Harris model appears to fit the general aspect of Highlands societies very well. It predicts the low population growth rates which are characteristic of Highlands population, the chauvinistic behavior often attributed to Highlands males, as well as the simultaneous low status and high value of Highlands females. If it is found to be rigidly applicable, the ambivalent attitudes displayed by Highlands males toward females could be partly or wholly explained as a response to the operation of this system. In order to test the model for fit, several of the diagnostic variables of the model will be discussed and evaluated below. The variables selected for evaluation are warfare, polygyny, sex ratios, and female infanticide.

A considerable amount of space is expended below in discussing the occurrence of unbalanced sex ratios and female infanticide. The justifications for this are that if female infanticide can be shown to be prevalent it can be interpreted as a serious act of social control and violence directed against females, and that Divale and Harris consider unbalanced sex ratios to be the main diagnostic quantitative variable of their causal system.

## THE MODEL EVALUATED: WARFARE, POLYGYNY, SEX RATIOS, AND FEMALE INFANTICIDE

### Warfare:

Warfare was a very widespread phenomenon in Highlands New Guinea prior to pacification by the Australian administration (Meggitt 1964:205, 1977; Read 1954). It is probable that all Highlands societies were involved in some form of warfare complex, although the intensity and character of warfare varied considerably from place to place. There can also be little doubt that warfare resulted in many of the effects predicted by the Divale/Harris model. For instance, the dispersal of land into local group territories separated by frontier zones seems to have been a response to warfare, and probably, ultimately, to pressure on resources. There is an ongoing discussion concerning the whole question of the adaptive value of prestate warfare

(see Vayda:1961; Hallpike:1973). However, whether or not one feels that warfare served as an adequate redistributor of population, I think that there can be little doubt that the effect was present.

While it may be argued that the character of New Guinea warfare would result in nearly random killings with respect of sex (David Counts 1981: personal communication), evidence from the literature indicates that warfare related deaths were almost always male deaths. Heider (1970:107), for instance, recorded 8 warfare related casualties in 9 months among the Dani, all of them male. Pospisil (1958:91) reported that among the Kapauku, women frequented the battlefield to retrieve arrows for their husbands, but that while they might be raped by the enemy, they were never killed.

On the other side of the coin Highlanders generally attach a great deal of importance to men's status as warriors, and expend a great deal of effort in preparing male youths for a life of war. Whether this concern with raising male warriors contributed to the practice of female infanticide is difficult to evaluate in light of the lack of data on the pervasiveness of infanticide.

One piece of evidence that links the prevalence of warfare to male-female relationships is the observation by some ethnographers (eg. Langness 1967:175) that as warfare was suppressed in the Highlands male-female relationships and residence patterns changed rapidly and radically.

Polygyny:

Polygyny is also a universal phenomenon in Highlands societies, although, once again, the extent to which it is practiced varies markedly from group to group (Kelly 1968:41). Explanation for the occurrence of polygyny in the literature are also varied but can be summarized as two basic approaches. One of these attributes the practice to unbalanced sex ratios, while the other suggests that polygyny is a response to long post-partum sex taboos. Harris and Divale's argument would subsume the first explanation although polygyny is seen to have several causes (Ember 1974). At least one ethnographer (Langness 1967:170) has related shortages of marriageable women in the Highlands to the practices of polygyny and female infanticide. This is the situation one would expect if the Harris/Divale model were operating.

Relative to the hypothesis put forth by Harris and Divale; that polygyny acts as a reward system for the more valorous warriors, it could probably be argued that in the Highlands, having more than one wife was more closely correlated to economic than to military success. However, these two categories need not be mutually exclusive. There may also be a factor of seniority in polygyny, as men get older they acquire more wives through a levirate type of system. Moreover, in at least some Highlands societies (Berndt 1962) males were required to kill one or more enemy warriors before they could arrange and/or consummate their marriages. This strongly suggests that women were to some extent seen as rewards for military exploits and successes.

I know of no literature which addresses itself specifically to the questions why and how some men acquire multiple wives in New Guinea. These subjects are worthy of further cross-cultural study.

Unbalanced Sex Ratios:

Divale and Harris have identified a particular pattern of sex ratios as a primary identifier of socioecological systems in which their male supremacist complex is operating. They suggest that there should be significantly more males than females in the pre-15 years age group, and that this imbalance should be decreased in the post-15 years age group (Divale and Harris 1976:525). Table I is a compilation of some sex ratio data from New Guinea societies. These data are far from exhaustive, and are presented as suggestive rather than definitive. At face value most of the data would tend to support Divale and Harris' arguments. However, I contend that these authors have assumed a rather unicausal approach to sex ratios. They state that human sexual dimorphism causes more males than females to be born into human populations at a ratio of 105:100,[2] and that fluctuations greatly in excess of this ratio indicate a post-partum selective process. This process they identify as infanticide (Divale and Harris 1976:525), especially female infanticide, since their data indicate that most often sex ratio fluctuations in band and village systems strongly favour males. I will indicate reasons below why I find this argument to be non-definitive, at least in the case of the New Guinea Highlands.

The first problem to be noted in this data is the lack of comparability in units of measurement. In three sets of data (Etoro, Tor, Mintima) the division between children and adults is set at 16 years, in two others (Tsembaga, Kapauku) it is set at 15 years, in a sixth at 20 years (Busuma), for one (Dani) there are no data, and for the final one (Waropen) married persons are classified as adults, and unmarried persons as children. I would argue that the data for the Waropen can be ignored immediately because in societies where men usually marry at a later age than woman as is common in New Guinea, any such division will create sex ratios exactly like those predicted by the Divale/Harris model. The Busuma data cannot be profitably compared to the model's predictions because the age separation at 20 years is too late -- males in late adolescence may already be active warriors and, thus, the data will be prejudiced by male deaths. Data for the remaining groups are roughly comparable to that cited by Divale and Harris (1976:534-35), but grouping differences of even one year may well prejudice the data significantly.

The Dani data present an interesting case for comparison. There are no data cited for how the children-adult groups were divided; however, the sex ratios indicate that men are outnumbered significantly by women in both age groups (a ratio of 80:100 for the total population). This would indicate that the Dani do not fit into the male supremacist model, although we know from Heider's ethnographies that warfare was present and intensive among the aboriginal Dani, and that polygyny was also practiced. The most reasonable interpretation of these data is that male deaths through warfare is the major

TABLE 1: New Guinea Sex Ratio Data

| Cultural Group: | Census Date: | Total Population Size: | Demographic Breakdown: | | Sex Ratios: | Reference |
|---|---|---|---|---|---|---|
| | | | Children (unmarried): | M = 385<br>F = 300 | 128:100 | |
| Waropen | 1938 | 1610 | | | | Held 1957:23 |
| | | | Adults (married): | M = 416<br>F = 509 | 82:100 | |
| | | | Children ( ≤ 20): | M = 169<br>F = 146 | 116:100 | |
| Busuma | 1944 | 578 | | | | Hogbin 1951:293 |
| | | | Adults ( > 20): | M = 121<br>F = 142 | 82:100 | |
| | | | Children (n.d.) | n.d.<br>n.d. | 96:100 | |
| Dani | 1962 | n.d.* | | | | HRAF<br>Divale and Harris 1976:534 |
| | | | Adults (n.d.) | n.d.<br>n.d. | 64:100 | |
| | | | Children (n.d.) | n.d.<br>n.d. | 96:100 | |
| Kapauku | | n.d. | | | | HRAF<br>Divale and Harris 1976:534 |
| | | | Adults (n.d.) | n.d.<br>n.d. | 92:100 | |

TABLE 1 Cont'd:

| | | | | | | |
|---|---|---|---|---|---|---|
| Kapauku | 1954-55 | 476 | Children (n.d.) | M = 100<br>F = 96 | 104:100 | HRAF<br>Pospisil 1958:67 |
| | | | Adults (n.d.) | M = 131<br>F = 149 | 88:100 | |
| Kapauku | 1954 | 181 | Children ( ≤ 14): | M = 41<br>F - 28 | 146:100 | Pospisil 1963:60 |
| | | | Adults ( > 14): | M = 50<br>F = 62 | 81:100 | |
| Tesembaga | 1963 | 204 | Children ( ≤ 14): | M = 46<br>F = 31 | 148:100 | Rappaport 1967:16 |
| | | | Adults ( > 14): | M = 68<br>F = 59 | 115:100 | |
| Mintima | 1960 | 898 | Children ( ≤ 15) | M = 152<br>F = 176 | 86:100 | Brown and Winefield 1965:188 |
| | | | Adults ( > 15) | M = 307<br>F = 273 | 112:100 | |

TABLE 1 Cont'd:

| | | | | | | |
|---|---|---|---|---|---|---|
| Upper Tor Valley | 1958 | 250 | Children ( ≤ 15) | M = 49<br>F = 26 | 188:100 | Oosterwal 1961:37 |
| | | | Adults ( > 15) | M = 90<br>F = 61 | 147:100 | |
| Etoro | 1968 | 274 | Children ( ≤ 15) | M = 55<br>F = 38 | 145:100 | Kelly 1977:29 |
| | | | Adults ( > 15) | M = 98<br>F = 83 | 118:100 | |
| Bomagai-Angoiang | 1965 | 154 | Children ( ≤ 14) | M = 43<br>F = 40 | 108:100 | Clarke 1971:19 |
| | | | Adults ( > 14) | M = 34<br>F = 37 | 92:100 | |

*n.d. indicates that no data were given for this value in the source cited.

selective process operating on members of the society. Male Dani in both age categories may have been warfare victims (eg., the Dead Birds film). Thus, the presence of some elements of the complex do not absolutely determine the pattern of unbalanced sex ratios predicted by Divale and Harris.

Another question involves the reliability of the data. In their (1976) paper Divale and Harris cite sex ratios for the Kapauku, taken from the HRAF, of 49% (96:100) among children and 48% (92:100) among adults. The date of the census from which these ratios were derived is given as 1954. When I consulted the HRAF I found data on the Kapauku (from Pospisil 1958) which rendered sex ratios of 104:100 for children and 88:100 for adults. Further, I consulted Pospisil's (1963) ethnography of the Dani from which I got sex ratios of 146:100 for children and 81:100 for adults. All of these figures were apparently drawn from 1954 censuses. One set of data would strongly support the operation of the model, the other two sets would not. I leave it to the reader to decide which should be used and which should not.

With respect to these problems of data grouping and accuracy, one should bear in mind the fact that New Guinea Highlanders lack any concept of measuring ages and other phenomena in calendar years. The ages cited in census data are estimates and there is no way to estimate their range of accuracy, after the fact. Sex ratios may also be biased in favour of males in the younger age groups because male children are seen as more important, more visible, and more apt to be accurately counted by ethnographers and informants alike.

To these problems can be added the effects of demographic fluctuations in small populations. If we accept that human sexual dimorphism does produce a typical sex ratio at birth of 105:100 then sex ratio fluctuations will naturally more often favour males. Social groups in New Guinea tend to be relatively small and can be subject to marked statistical fluctuations in sex ratio (Kelly 1968). Kelly indicates that imbalances of the order of 150:100 in favour of either sex could be created by random variations alone in small groups. Thus, Harris and Divale's assertion that only infanticide could account for such imbalances is an oversimplification.

The best test of their assertion would be a study which showed that sex ratios were consistently unbalanced in particular societies, in the pattern they describe as characteristic, over long periods of time under conditions of pre-state warfare, and which demonstrated that other factors were not operating to a significant degree. Such a study could not now be accomplished in New Guinea, and possibly nowhere else.

Finally, it is evident from the demographic work of Bennett (1962) that the disease Kuru produces sex ratio data similar to those predicted by the model in question. There is no assurance that other diseases and physiological factors are not operating in other areas to produce similar imbalances.

Divale and Harris have presented a powerful argument by demonstrating that sex ratio imbalances favour males in a statistically significant number of cases, in a large sample of societies drawn from around the world. The data which I have presented in Table 1 indicates that this is the case in New Guinea, and that sex ratio imbalances follow the pattern predicted by the male supremacist model in most instances (4 of the six reliable cases).

However, the data which Divale and Harris have presented for Oceanic societies does not produce a significant difference in sex ratio values between areas where warfare was practiced at the time of census, and areas which had been pacified for five or more years. Oceania is the only culture area covered by their study where such a difference was not significant among either junior or adult sex ratios (Divale and Harris 1976:529).

As a result of the observations made above I question the rigid applicability of the male supremacist model to New Guinea societies, and suggest that sex ratios alone are not a definitive indicator of the presence and operation of this system.

Female Infanticide

Although it has proven to be very difficult to obtain any reliable quantitative data on the pervasiveness of infanticide in Highlands societies, most ethnographers have noted that it is practiced on occasion, but have hastened to qualify these remarks by stating that it is not a very significant variable in population control. However, where and when infanticide does occur there seems to be a marked tendency toward selection against females (Bulmer 1971:153). Only rarely have ethnographers linked female infanticide to such phenomena as a lack of marriage able women (but for an exception see Langness 1967:166).

Because of the ambiguity of the sex ratio data one cannot make a convincing argument that female infanticide is a pervasive practice, but one that has not been obvious to ethnographers. Also, the lack of convincing evidence for a pervasive female infanticide complex feeds back into the previous discussion and substantiates the claim that sex ratio patterns are a non-definitive predictor of infanticide. It is unclear just how much female infanticide must be practiced in order to achieve any given level of sex ratio imbalance; thus, it is also difficult to assess whether the small amount of female infanticide reports as occurring in Highlands societies could effect significant sex ratio imbalances in the absence of other influences.

Female infanticide is an essential element in the Harris/Divale model, and if, in fact, it is not practiced significantly in the Highlands, this would throw a great deal of doubt on the applicability of the Divale/Harris model to that area. However, it is only fair to point out that the last word has not been said about sex ratios or infanticide. This part of the causal mechanism is worthy of much more research.

Summary:

This evaluation of the Divale/Harris model can be summarised as follows:

a) Variables relating to pressure on land have been controlled by assumption -- pressure on land is assumed to play a part in most Highlands socio-ecological systems.

b) There is ample evidence for the high economic and prestige value of women in the Highlands.

c) Polygyny occurs with variable frequency and appears to fulfill some of the functions predicted by the model.

d) Warfare occurs with variable intensity and frequency over the area and has some of the effects predicted by the model.

e) There appears to be a premium on maintaining the powerless status of women.

f) There also appears to be a premium on maintaining the powerless status of women.

g) Female infanticide does not appear to play a large role in Highlands societies, and is probably not practiced often enough to account for the characteristically low population growth rates, or for the most extreme sex ratio imbalances (see, for example, the Tor Valley data in Table 1).

h) Sex ratio data have been shown to be a non-definitive predictor of the occurrence of the model.

Thus, these data can be seen to be inconclusive because two of the key variables are not reliability substantiated. This analysis does not, of course, prove that the population, warfare, male supremacist complex is not operating in Highlands societies. It does, however, suggest that a revised version of the model may explain the data at hand more parsimoniously.

The analysis does suggest, as well, that researchers attempting to apply this model should be extremely careful in selecting and evaluating demographic data used to support it, and to avoid assuming unicausal explanations for the occurrence of demographic effects.

## THE MODEL REVISED: POPULATION PRESSURE, WARFARE, AND FEMALE PRODUCTION

It is possible that the variables outlined above, and others, can be used to revise the Divale/Harris model in order to increase its degree of fit with the Highlands ethnographic data, but at the same time maintain the division between variables increasing the value of

women, and variables decreasing the status of women. For instance, a recent study has indicated that there may be a significant correlation between the relegation of women to a low social status and low population growth rates (Sipes 1974). The same study also suggests that as the labour contribution of children to subsistence is decreased, the population growth rate also decreases. An alternative formulation of the Divale/Harris model is presented below, which incorporates these observations.

Highlands ethnographies indicate that, in general, low popuation growth rates are characteristic of the area, as is low female social status (Bulmer 1971), and that the contribution of children to subsistence is minimal (eg. Langness 1967:166). Figure 2 is a rearrangement of the variables in the Divale/Harris model in which the two most troublesome variables assessed above have been replaced by other variables which are more in accordance with Highlands socio-ecological systems as they have been generalised here.

Once again pressure on land is assumed to be the driving mechanism behind the process, and it is again related to the need to regulate population size and population distribution. Warfare is posited as the redistributive mechanism, and results in a premium on raising aggressive male warriors. However, a new variable has been added at this point. This variable is the degree to which males are preoccupied with warfare. The argument here is that since war is essentially a male concern, as its intensity and frequency increases so will male preoccupation with warfare. Preoccupation can be translated into time and energy expended in war related activities. I would argue that, given a fixed amount of subsistence labour to be accomplished, as men spend more time involved in warfare, women will be required to spend more time involved in subsistence activities. I would further argue that one could expect a correlation between the amount of hard physical labour women perform, and the length of birth spacing which women find desirable. This argument has been drawn, in part, from a discussion in which Bulmer (1971:147) relates deliberate birth spacing to the amount of subsistence labour which women undertake on an individual rather than a co-operative basis.

Such a correlation has been demonstrated for the !Kung Bushmen by Lee (1979:317-325). It is worth noting that Lee attributes wide birth spacings among the !Kung hunter-gatherers primarily to a suppression of ovulation in mothers due to prolonged lactation and nursing, and not to infanticide; apparently birth spacing in the !Kung case is not reinforced by an overt taboo against post-partum sexual intercourse. This birth spacing mechanism has been observed to break down among !Kung who have adopted a sedentary agricultural lifestyle. Possibly the sedentary and agricultural New Guinea Highlanders require a strong taboo to reinforce birth spacing because there are factors in this type of lifestyle (Lee suggests soft foods that facilitate early weaning) that allow or encourage short birth spacings.

The need to space births may be increased by the general pressure of emically perceived population growth as well as the intensity of female labour. This causal network suggests that the long post-partum

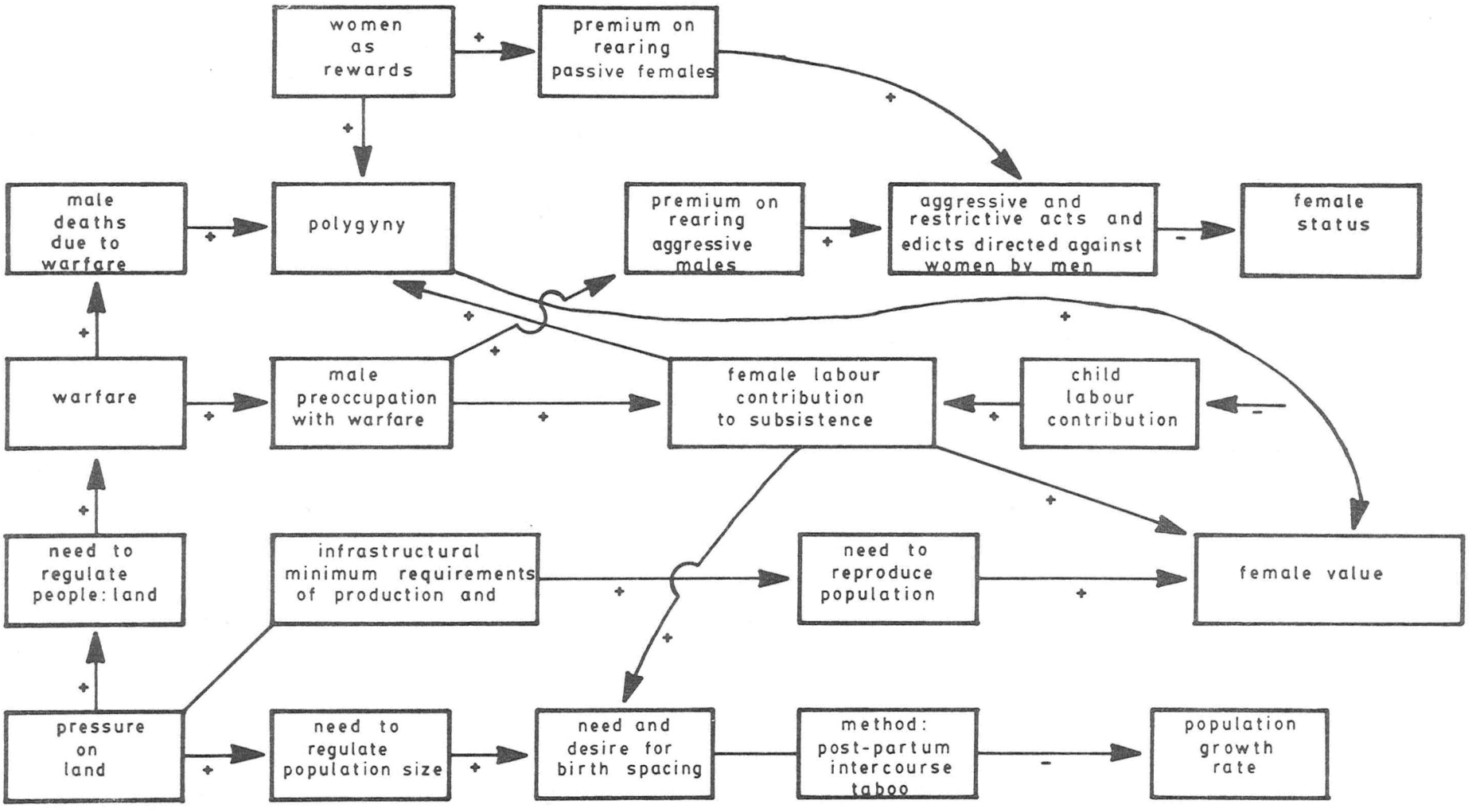


FIGURE 2: POPULATION, WARFARE, AND FEMALE LABOUR.

taboo on sexual intercourse may be looked upon as a better method of achieving low population growth rates that post-partum selection, because pregnancy itself, and not just children, would interfere with subsistence labour. This model then supports the opposite explanation of polygyny than the Divale/Harris model, by relating long post-partum taboos to polygyny. This explanation is not strongly supported by Ember's (1974:204) research, but it is substantiated by Nag's (1962:143) evidence that polygynous individuals are more likely to adhere rigidly to the post-partum taboo that are monogamous individuals. Abortion cannot be considered to be a viable alternative method of birth spacing because of the traumatic effects of paleotechnic abortion methods on valuable adult women (Bulmer 1971:153; Divale and Harris 1976:531).

The practice of polygyny and the large female contribution to subsistence can be seen to increase the value of women. At the other end of the scale, the role of women as rewards for warriors, and the resultant premium on rearing passive women can be seen to contribute to the low status of women.

Thus, we are left with the same polarization between the value and the status of women which I have suggested as a determinant of the ambiguity of male attitudes toward females. This system eliminates any reason to expect markedly unbalanced junior sex ratios due to female infanticide, and as well, posits reasons why the post-partum intercourse taboo would be chosen as a method of population control rather than female infanticide. A causal network has also been proposed which would account for the correlation between low female status and low population growth rates.

The two new variables used; female labour contribution to subsistence, and the need, desire, and ability to space births, can be readily substantiated from Highlands ethnographic literature. Most ethnographers would probably be comfortable with the notion that low frequency of coitus resulting from various taboos accounts for the generally low population growth rates (Bulmer 1971; Nag 1962; Langness 1967:170; Heider 1976). This alteration of the model suggests reasons for the significant labour contribution of women to subsistence activities in cultures practicing paleotechnic horticulture. The argument presented in this model which relates intensity of warfare with increased female labour inputs into subsistence is a hypothesis which should be tested against the existing literature, and in future field studies.

## SUMMARY AND CONCLUSIONS

An attempt has been made to link infrastructual variables to an observed ambivalence on the part of male toward females in the New Guinea Highlands. The initial hypothesis made in the study suggested that men regarded women as valuable but also as dangerous, and related the danger to the reproductive capacity of women. Control exerted by

men over women, resulting in the low status of women, was suggested to be related to control of production.

A causal network of infrastructural variables has been developed and substantiated by Highlands ethnographic data, which, indeed, demonstrates how variables relating to the control of reproduction may be articulated with variables relating to the low status of women. This hypothetical model is intricate and tenuous. It would appear that, given the post-partum intercourse taboo rather than female infanticide as the primary means of population control, male control over women may be more directly causally related to the position of women in a reward system (as a commodity, if you will) than it is to control population size. Since the post-partum taboo requires the co-operation of both sexes, control of the reproductive capacity of women is probably as much or more a female than a male concern.

The model presented in this paper is based partially on the male supremacist model proposed by Divale and Harris. In revising the model to fit Highlands ethnographic data, I have unfortunately eliminated the most easily quantifiable variable in the model -- sex ratios. In spite of the problems I have outlined above concerning collecting, and interpreting sex ratio data, it is undoubtedly an easier subject upon which to collect reliable quantitative information than either the degree of adherence to post-partum sexual intercourse taboos, or the relative amounts of energy which men and women put into subsistence activities and/or warfare. In this sense my reformulation of the model is inferior to the original, and would be more difficult to test.

None-the-less, it has been possible to suggest ways in which infrastructural variables may affect relationships between males and females in New Guinea societies. These factors should be taken into account, and linked to structural and superstructural factors which also contribute to these relationships. Materialist and idealist explanations need not be mutually exclusive, and the causal network proposed here is intended to form a part of more complex multi-causal, and mutual-causal, processes.

A general model is only as good as the generalizations upon which it is based. Generalizations used in this study have been substantiated in only a very sporadic manner. It would be desirable to test generalizations concerning New Guinea societies such as the ubiquity of warfare, polygyny, ambivalence, intersexual hostility, low population growth rates, long post-partum intercourse taboos, and so on, against the existing ethnographic data in a quantitative manner, and, if possible, to compute statistical estimates of their reliability, and demonstrate the degree of areal variability characteristic of these phenomena.[3]

## NOTES

1. This possibly cryptic title refers to an incident reported by Langness (1967:172) in which a Bena Bena Highlander, commenting on the value of women, remarked, 'Women are our tractors.'

2. Here and elsewhere in the paper sex ratios are expressed as numbers of males per 100 females.

3. I would like to thank Dr. David Counts and the other members of his Anthropology 716 (Fall/1980) seminar on sex and gender in Oceania for their able criticism of the earlier drafts of this paper.