

## **The relevance of the concept of inclusive fitness to human society.**

[1984]

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### *1. The concept of 'inclusive fitness'.*

The concept of 'inclusive fitness' was introduced by W. D. Hamilton (1963, 1964) in an attempt to account for the evolution by natural selection of 'altruistic' characteristics '...where an animal behaves in such a way as to promote the advantages of other members of the species not its direct descendants at the expense of its own' (1963: 354). Standard examples are distastefulness in caterpillars, where in order to signal to a predator that a certain appearance is related to obnoxious taste, the carrier of the gene for distastefulness has first to be eaten; or alarm calls by birds which increase the risk to themselves from a predator by warning other birds of its presence. After reviewing some arguments against the theory of group selection he suggests (developing ideas of Fisher 1930 and Haldane 1955) that there is a way in which the theory of natural selection can be extended to the evolution of 'altruism':

As a simple but admittedly crude model we may imagine a pair of genes  $g$  and  $G$  such that  $G$  tends to cause some kinds of altruistic behaviour while  $g$  is null. Despite the principle of 'survival of the fittest' the ultimate criterion which determines whether  $G$  will spread is not whether the behaviour is to the benefit of the behavior but whether it is to the benefit of gene  $G$ ; and this will be the case if the average net results of the behaviour is to add to the gene-pool a handful of genes containing  $G$  in higher concentration than does the gene-pool itself. With altruism this will happen only if the affected individual is a relative of the altruist, therefore having an increased chance of carrying the gene, and if the advantage conferred is large enough compared to the personal disadvantage to offset the regression, or 'dilution', of the altruist's genotype in the relative in question (Hamilton 1963: 355).

'Inclusive fitness' thus denotes not merely the 'fitness' or reproductive success of the individual organism, but of the particular genotype which that organism shares with his relatives, and the theory of inclusive fitness thus proposes the replacement of *the group* as the unit of selection by the individual or, more precisely, by genes shared by close relatives, and each organism is supposed to 'attempt' to maximize the proportion of its own genes in the group of which it is a member. Individuals therefore follow strategies to increase their inclusive fitness, and have been selected *as if* they were doing a cost/benefit analysis before deciding on the approximate course of action in any given situation. To this end acts of assistance involving self-sacrifice will be of selective advantage only when they

benefit a sufficient number of kin as opposed to non-kin, and the theory therefore indicates that the propensity for altruism and selfishness will be directly correlated with genetic relatedness.

The technical terms ‘altruism’ and ‘selfishness’ are thus basic to the theory and it is important to see how they are defined:

An entity, such as a baboon, is said to be altruistic if it behaves in such a way as to increase another such entity’s welfare at the expense of its own. Selfish behaviour has exactly the opposite effect. ‘Welfare’ is defined as ‘chances of survival’ [and, the implication must be, of reproduction], even if the effect on actual life and death prospects is so small as to *seem* negligible. One of the surprising consequences of the modern version of the Darwinian theory is that apparently tiny influences on survival probabilities can have a major impact on evolution. This is because of the enormous time available for such influences to make themselves felt (Dawkins 1978:4).

Sociobiologists such as Wilson, Dawkins, and Alexander have also maintained that it is possible to explain human as well as animal behaviour by this theory:

...it resolved the ancient philosophical paradox whether humans are really selfish individualists or group altruists, and provided, I believe, the first simple, general theory of human nature with a high likelihood of widespread acceptance (Alexander 1979:xii).

And,

This general view of organic evolution I regard as firmly established; I do not expect any significant part of it to be retracted or altered in the future . . . the new view of natural selection provides a solid theoretical base from biology with which to pursue the questions of human sociality and the nature of culture (ibid., 65).

I shall argue, however, that when applied to human society the concepts of ‘altruism’, ‘selfishness’, (and related notions, such as ‘investment’) are logically confused, predictively empty, empirically false, and based on a comprehensive misunderstanding of the nature of social systems.

But, it should be noted, my arguments will *not* assume as do those of some social anthropologists that man is a *tabula rasa* on which culture and the environment can write more or less what they will. There seems no doubt that genetic factors, in a broad sense, have an important influence on human behaviour and biologists and psychologists can make an immense contribution to our understanding of human society and culture by their researches into the universals of human nature as these can be inferred from existing populations. I am not therefore concerned here with the validity of sociobiology as such, or with particular theories such as Lumsden’s and Wilson’s (1981) gene-culture co-evolution, but simply with some of the defects of inclusive fitness theory when it is

applied to human society.

But to accept the existence and importance of ‘human nature’ does not commit one to any acceptance of a close relation between particular forms of social behaviour and particular genes. It is all very well for Alexander to claim: ‘Even if we are yet unable to specify the proximate mechanisms whereby cultural variations can reflect a history of differential reproduction, the best hypothesis at the moment is that such mechanisms, connecting culture and genes, do nevertheless exist (Alexander 1979: 217). But the lack of any such evidence results in a theory rather like a production of ‘Hamlet’ without the Prince of Denmark, and it is necessary to keep this fundamental weakness of inclusive fitness theory constantly in mind when we discuss its relevance to human society in the rest of this paper.

## *2. Altruism, selfishness, and investment*

Hamilton’s theory was developed to explain altruistic behaviour in species such as bees, wasps, ants, rabbits, and birds where there is a close relationship between behaviour and genotype, a low level of intelligence and communicative ability by comparison with man, and, with the exception of the social insects, a low level of co-operative complexity. In such species, where individuals may not even have permanent social identities for purposes of recognition, and where it is not possible for individuals to inform others about which members of the group attempt to gain benefits without reciprocation, for example, so that each interaction can be treated in isolation from others, it may make sense for ‘altruism’ and ‘selfishness’ to be presented as quite distinct behavioural strategies, e.g.:

Black headed gulls nest in large colonies, the nests being only a few feet apart. When the chicks first hatch out they are small and defenceless and easy to swallow. It is quite common for a gull to wait until a neighbour’s back is turned, perhaps while it is away fishing, and then pounce on one of its neighbour’s chicks and swallow it whole. It thereby obtains a good nutritious meal, without having to go to the trouble of catching a fish, and without having to leave its own nest unprotected (Dawkins 1978:4).

Because such creatures cannot tell one another which member of the group has been making a meal of its neighbour’s offspring, such strategies may pay off and it can be argued that, in a group of altruistic organisms, an individual with genes for selfishness would, through its descendants, spread those genes through the population at the expense of individuals with altruistic genes. But in the case of human society, where the members are a good deal more cooperative and intelligent than black headed gulls they are aware that they live in a complex and interdependent form of association, so that if my neighbour

needs help today I may need help tomorrow or next year, and they can also inform one another about which members of the group cheat. The more arduous the mode of life, or the more complex the problems to be solved, for example, the greater will be the benefits to *each individual* of mutual assistance. So, if bodies are survival machines for genes, it is equally true that groups are survival machines for human bodies.

In this context, it makes very much less sense to present 'altruism' and 'selfishness' as though they were distinct strategies leading to quite different types of behaviour. No doubt, if one imagines certain isolated interactions, such as a man jumping into a river to save a drowning child or, on the contrary, a man who prefers to eat his sandwiches on the river bank and let the child drown, one can easily find illustrations of altruistic and selfish behaviour that are indeed very different. But the point is that in human society it is quite unrealistic to suppose that any individual could maximize his inclusive fitness as the sum of a series of isolated interactions of this kind. We therefore find that those individuals who follow elementary strategies of 'selfishness' and 'cheating', and persistently attempt to get without giving in social relations are not only rapidly detected but punished by sanctions ranging from contempt and low status to expulsion from the group or death. Correspondingly, rewards go not to the obvious spongers and cadger and delinquents but to those who are perceived (rightly or wrongly) to contribute most to the welfare of the group. (I shall discuss exploitation in a moment.) Let me quote an instance from my own research in Papua New Guinea (Hallpike 1977a) to illustrate this.

The Tauade are pig-rearing swidden agriculturalists of the central mountains of Papua and, like many of the societies of this cultural area have gradations of social status, with chiefs or 'big-men' at the top, and 'rubbish-men' at the bottom. The principal roles of the chiefs are the organization of feasts and dances, at which they make speeches on behalf of their group; the negotiations of peace between their group and others; and, to some extent, leadership in war. Their essential personal attributes are generosity, oratory, and political skills, and a willingness to accept compensation for wrongs rather than resort to violence at the slightest provocation. Typically, they maintain fairly stable polygynous unions of two or three wives. The rubbish-men, on the other hand, are the least effectual members of society: they are mean and avaricious, attempt to renege on their co-operative responsibilities such as contributing to feasts or making gifts on appropriate occasions, and are also said to be the worst thieves (theft being below the dignity of chiefs) and to be generally irresponsible. There is no doubt that chiefs are

reproductively more successful than the rubbish-men, and yet it is precisely the chiefs who are perceived to give the most to their groups.

But what sense does it make to say that the Tauade chiefs are *either* 'selfish' or 'altruistic' as these terms are defined in inclusive fitness theory? Their leadership requires more outlay of time and energy than is expended by the rubbish-men, but the benefits that accrue to them as a result are correspondingly greater, too. Sociologically speaking, we would say that the chiefs have greater effectiveness in social relations because they invest their social energies in a way that will reap the greater rewards, whereas the rubbish-men are socially ineffective because they think in terms of the immediate costs to themselves of socially useful actions rather than in terms of future rewards.

Thus in this society there are 'winners' and 'losers' in terms of social influence, but we gain no analytical advantage from trying to explain these differences as the outcome either of altruistic or selfish strategies, since as far as many instances of reciprocity are concerned, 'altruism' often turns out to be enlightened self-interest. In other words, co-operation and competition in human society are not mutually antithetical modes of behaviour, but are often mutually interdependent, so that to compete effectively one must be able to attract supporters and create networks of alliance and friendship, to which end assisting both kin and non-kin is often an intelligent strategy.

The essential vacuity of sociobiological theories of co-operation emerges even more clearly when we realise that Trivers (1971) advanced the argument that reciprocity even between non-relatives may also be of selective advantage (in order to account for reciprocal services between members of different species, such as cleaner fish and their hosts, where in the nature of things inclusive fitness cannot be involved), and see Eberhard (1975:21, 22). Trivers argues that 'reciprocal altruism' between non-kin can be selectively advantageous for the parties concerned, since each can expect to derive important benefits if the organism on which a benefit is conferred is prepared to reciprocate in kind when the original benefactor needs it in his turn. This will be especially true in the case of organisms such as man with a long life span, low dispersal rates, a high degree of mutual dependence and paternal care, the absence of rigid dominance hierarchies, and the need for combat assistance. He concludes that it will not be necessary for the original beneficiary to reciprocate, and that systems of generalized reciprocity can develop in human society. Trivers' theory of reciprocal altruism is certainly much closer to the facts of human co-operation than that of Hamilton. But the very reasonableness of the theory means, ironically, that the predictive value of inclusive fitness theory with regard to

altruism and selfishness in human society is reduced to about zero. For we now have the predictions that in some circumstances people will give benefits to, or 'invest in', their kin, and that in others they will give benefits to non-kin. No doubt this is quite true, but it amounts to nothing more than the affirmation that *all* the various forms of human reciprocity are biologically possible, in so far as some argument of natural selection can, on the basis of these theories, always be constructed to 'explain' any act of reciprocity reported by social scientists.

For humans, then, the surest method of ensuring social failure and, presumably, some corresponding decrease in inclusive fitness, is to follow simple strategies of 'selfishness' or 'cheating'. But human society provides at least two basic means by which some individuals can enrich themselves and their relatives at the expense of other members of the group. The successful person may gain control over some crucial resource such as land or cattle, or some crucial process, such as political leadership, and use this as a basis for exploitative relations with dependent individuals, who are induced to confer more benefits on the dominant individual than the costs to him of maintaining control over them. Or, the successful person may have some ability, such as specialized knowledge, that is valued by the rest of the group but is in short supply, and thereby extract more benefits from the rest of the group than the cost of supplying such services. In many cases, of course, there is no sharp distinction between these two basic ways of extracting payments from others, and politicians in particular (including Tauade chiefs) are fond of presenting relationships of the first kind as though they were of the second. But it is clear that social success as attained by these means will depend on a wide variety of specific abilities and personality traits, and is not some simple trait like 'altruism' or 'selfishness' that could conceivably be selected for, on a genetic basis.

We should now turn from the consideration of 'altruism' and 'selfishness' to the question of cost/benefit calculations in social relations: this is obviously an equally important aspect of inclusive fitness theory, since it is only in terms of the relations between costs and benefits that the question of why one individual should make a sacrifice to benefit another, perhaps unrelated, individual is raised at all.

Animals can only assist one another by doing something with their bodies, which inevitably involves energy expenditure and possibly danger as well, while the benefits of assistance are also restricted to physical welfare, and therefore it is likely that there will be a reasonably close relation between costs and benefits. But while this limited basis for animal cooperation lends plausibility to inclusive fitness theory at the level of birds, ants,

and fish, it also severely reduces its relevance to human society, since one of the distinctive features of human society, besides its high level of co-operation and communication, is that it operates with all kinds of surpluses, a condition which potentially removes the necessity of any close relationship between the cost of bestowing a benefit and its value to the recipient. In human society there are many examples where large benefits, which clearly increase the reproductive chances of the beneficiary, are bestowed at little or no cost to the benefactor, e.g. the inheritance of property or an office from a deceased person, who can by definition no longer enjoy it himself, or the provision of surplus land to a person or group which needs it, of advice to the ignorant, of a job to a starving man, or of an honour conferred by a monarch or president. Thus, the resources from which the benefit is given (be they property, employment, knowledge, time, or anything else) many not be needed, or be so abundant, or so easily renewable, that no sacrifice on the part of the benefactor is involved in their depletion, and hence no 'altruism' either. It is surely obvious that this asymmetry between the value of a benefit to a recipient and its cost to the benefactor, which we often find in human society, is made possible by surpluses of a kind for which there is no analogy in the animal kingdom.

Correspondingly, we also find that many benefits have no effect whatsoever on the welfare, or reproductive chances, of the recipients. This is partly because, as in the cases of many customary prestations, the value of the gift is primarily determined by its cultural significance rather than by any material importance. But it will also be recalled that Dawkins maintains that even effects on actual life and death prospects that *seem* so small as to be negligible may have cumulatively great effects on the selective process 'because of the enormous time available for such influences to make themselves felt', during which, it is presumed, even the slightest influences on survival probabilities have selective value. Dawkins seems to suppose that the relationship between benefits and chances of survival can be described by a continuous curve so that, for example, if doubling a man's salary increases his life chances by a certain amount, then giving him a raise of 1% will also have *some* measurable effect on his life chances too. Knowledge of the real world, however, tells us that the relationship is very often a *discontinuous* one, so that below a certain threshold benefits will have absolutely no effect on survival in particular instances and that therefore, however enormous the amount of time available, they can have no cumulative effect either. This will be especially true in societies where all adults have equal access to basic resources for survival and reproduction, and where reciprocity is governed by rules applying to all members of society. It follows that even when such benefits are

bestowed they cannot be regarded as ‘investment’ in the way that the theory defines this. But to the extent that a good deal of reciprocity in human society is unrelated to the welfare of benefactors and beneficiaries, it is to that extent outside the predictive scope of inclusive fitness theory.

The assumption that mutual assistance in human society must involve self-sacrifice is therefore a myth, once we consider a society as a long-term system of transactions. Human beings are sufficiently intelligent to recognize their mutual interdependence, and the organization of reciprocity is a response to this need that can be explained in terms of enlightened self-interest. Strategies of exploitation or the provision of valued services may be a means by which one individual extracts more benefits from another individual than it costs him to maintain the relationship with that individual, but to pursue such strategies requires a complex and variable set of personality traits so that they cannot be selected for genetically, especially since they will also be highly dependent on details of social organization.

Many benefits, moreover, do not even involve a sacrifice of welfare on the part of the donors, and may result in no measurable increase of the recipients’ welfare either. In such a context, therefore, calculations of ‘altruism’ and ‘selfishness’ are meaningless as a basis for explaining co-operation and reciprocity, and there is consequently no reason for supposing that either of these behavioural strategies could have any distinctive genetic basis which could be subject to a process of selection. This being so, the distinction between kin and non-kin which is so crucial to inclusive fitness theory does not have the significance attributed to it, as far as human society is concerned.

### *3. Inclusive fitness theory and human kinship*

Inclusive fitness theory assumes that every human being, whether consciously or not, has the primary goal of maximizing the proportion of his own genes in the gene pool, and therefore makes the elementary mistake of supposing that biological relationships are the basis of social systems of kinship. Alexander thus claims ‘patterns of kinship will be centrally important in human societies’ (Alexander 1979:145), and quotes with approval Radcliffe-Brown’s distinctly antiquated statement of 1924 ‘In most primitive societies the social relations of individuals are very largely regulated on the basis of kinship’ (ibid., 145). While it must necessarily be the case that individuals in small-scale band societies of hunter-gatherers will have a high degree of inter-relatedness and that, as Alexander says,

for the great proportion of his history man has lived in such societies, we do *not* find that kinship continues to be the central social principle as societies increase in organizational complexity. In the great majority of primitive societies social relations based on criteria other than kinship - residence, sex, age, friendship, work co-operation, exchange, trade, social class, military organization, and so on — are essential aspects of social organization and become increasingly important at the expense of kinship with additional size, complexity, political centralization, and economic development.

For example, the Konso of Ethiopia, who are advanced terrace and manure agriculturalists, live in walled towns numbering about 1500 persons on average. Towns are divided into wards, and lineages are deliberately dispersed among the wards because the people explicitly say that they do not like living too closely with their relations. Ward members have important reciprocal obligations to one another irrespective of kinship. Named working parties also exist, and here too one finds that kinship plays no part in the composition of the group, so that even brothers are seldom members of the same working party. Generational seniority and residence are the dominant principles of Konso social organization, with kinship having only a subordinate position (see Hallpike 1972 and Lewis 1974 for further details of this type of social organization). Innumerable examples could be quoted from the ethnographic literature to refute the idea that primitive societies are ‘very largely regulated on the basis of kinship’.

Ideally, Alexander and other inclusive fitness theorists should be able to find examples of social institutions involving kinship that cannot be explained by traditional social theory, but which inclusive fitness theory can explain. We find, on the contrary, that there are many institutions which are very hard to explain by inclusive fitness theory, such as clerical celibacy, or strict primogeniture in the male line as among the English aristocracy where the bulk of family assets are inherited by only one child, or lineal descent groups involving the devaluation of social links with biologically equally close relatives in other lineages, or the propensity in societies like our own, with unequal access to material resources, for the more affluent to take the lead in limiting their families, and so the list might be extended. Explanations for these practices already exist, however, in standard social theory. One may also ask, to what extent such highly complicated phenomena as those of kinship systems could be reduced to any of the elementary strategies which are basic to inclusive fitness theory.

We can put these arguments to the test by examining one of the claims of the inclusive fitness theorists to have solved an important problem of social organization.

Alexander 1979, Gaulin and Schlegel 1980, Greene 1978, and Kurland 1980<sup>1</sup> maintain (with the support of Barkow, 1980:173, 177) that the relationship between mother's brother and sister's children (the 'avunculate') is explicable to a significant extent<sup>2</sup> by consideration of the degree of confidence which fathers have in the paternity of their own children. According to Alexander,

In many societies, paternal responsibilities are assumed, and benefits dispensed, not so much by one's putative father, or mother's spouse, as by a particular uncle, the mother's brother; or, in some societies, the mother's brother is at least as important a dispenser of such benefits. (Alexander 1979: 1969)<sup>3</sup>

and he remarks that this relationship 'has often puzzled students of culture'. At first glance it has also puzzled sociobiologists, since to dispense benefits to a sister's children rather than to one's own is the opposite strategy to that which inclusive fitness theory would predict, and Alexander proposes that this is one of 'the most provocative and outstanding apparent contradictions of an evolutionary view of human behavior' (ibid., 168).

His explanation is that when confidence of paternity reaches a sufficiently low level investment in one's sister's children will be a significantly better bet than investment in one's own for maximizing inclusive fitness, since for obvious reasons it is much easier to be certain of a child's mother than of its father. So, he concludes:

... a general society-wide lowering of confidence of paternity *will lead to* [my emphasis] a society-wide prominence, or institutionalization, of mother's brother as an appropriate male dispenser of paternal benefits (Alexander 1979:172).

How, in the first place, is the level of confidence in paternity to be established? Common sense would suggest, and the general experience of ethnographers confirms, that people the world over do not usually talk freely to outsiders of their sexual adventures and infidelities, nor are men likely to admit that they have been cuckolded. It is therefore impossible to obtain any direct cross-cultural data on the degree of paternity confidence and we have instead to use some other index, such as female extramarital promiscuity. Broude and Greene 1976 have made a cross-cultural study of sexual attitudes and practices, using 186 societies from Murdock and White's 1969 standard cross-cultural sample, and it is this body of data which forms the basis of subsequent discussion here.

P. Greene 1978 used only the data on female extramarital promiscuity in Broude and Greene, but there is only information on 54 societies out of 186 for this variable, and the sample of societies so generated is unrepresentative of the total sample. Greene initially

attempted to investigate the relation between female promiscuity and residence with the mother's brother ('avunculocal' residence), but in only 3 cases of this is information also available on female promiscuity. As she herself concludes 'It is... impossible to draw any conclusion from so few cases'.

Gaulin and Schlegel also use Broude and Greene's data, but to estimate the level of paternity confidence they combined three variables: female extramarital promiscuity, wife sharing, and a single standard permitting extramarital sex for both sexes. 'If one or more of these conditions obtained, the society was coded as having a low level of paternal confidence' (ibid., 302), otherwise it was coded as having high paternal confidence. On this basis it was possible to rate 134/186 societies (as opposed to 54) in terms of high and low paternal confidence, and these results were then correlated with a cross-cultural study of social agents in childhood (Barry *et al.*, 1977) '...with respect to the involvement of individuals other than the pater and mater as caretakers and educators of children in four age-sex categories' (ibid. :303). Their conclusions are interesting:

...in low paternal confidence societies there is no tendency for the mother's brother to be important as either caretaker or educator of either sex during either early or late childhood (ibid., 304).

Indeed, despite the fact that more than 45% of the societies (61/134) had low paternal confidence, only in 11% of cases (15 societies, 9 of which are in North America) was the mother's brother involved at all in caretaking or education. The authors then modified their hypothesis as follows: 'High paternal confidence leads to high investment by a man in his wife's children; low paternal confidence leads a man to channel his investment elsewhere' (ibid., 304). Where, exactly? They propose that rules for the inheritance of real and movable property, succession to the office of local headman, residence rules, and modes of reckoning descent may all be expressions of mother's brother's investment, and I have summarized their conclusions (ibid., 305, Table 2) in Table 1 below:

*Table 1 Investment patterns and paternal confidence*

Investment patterns	Low paternal confidence	High paternal confidence	X <sup>2</sup>	P
Residence	matrilocal, avunculocal, uxorilocal	patrilocal, virilocal, neolocal	7.783	0.005
Inheritance of real property	no fixed rules, sister's son, other matrilineal	sons, children, other patrilineal	6.599	0.010
Inheritance of movable property	no fixed rules, sister's son, other matrilineal	sons, children, other patrilineal	5.146	0.023
Descent system	matrilineal	patrilineal, bilateral	2.784	0.095
Succession to office of local headman	sister's son, other matrilineal non-hereditary	sons, other patrilineal	2.618	0.106

The authors claim that

Although only three of the five possible tests reach conventional levels of statistical significance . . . when all the results are in the predicted direction, as they are in this case, a reasonable estimate of the statistical significance of the entire set of tests is simply the product of the individual *p* values. For the tests presented in Table [ 1 ] such a calculation yields an aggregate *p* = 0.00000001. It seems fairly unlikely that we are looking at a chance association (ibid., 306).

It does indeed, but is this association what the authors think it is? It will be seen from Table 1 that there is a clear tendency for low paternal confidence to be associated with matrilocal residence and matrilineal inheritance of property, office, and reckoning of descent and, conversely, for high paternal confidence to accompany patrilocality and patrilineal inheritance and descent reckoning. So what the authors have really been doing is simply to explicate the social structure of matrilineal versus patrilineal descent groups in general, and of matrilocality versus patrilocality (and its variants) in particular.

It is important to distinguish between kinship terminology, rules of descent and the groups defined by them, and rules of marital residence. As Murdock (1949: 201) points out, 'kinship terminology reacts very slightly if at all to external influences', while rules of descent and the groups resulting from them also adjust fairly slowly to changes in other areas of social organization, such as political centralization or the economy. 'There is abundant evidence that they tend long to outlast the influences which produce them, as is demonstrated by the frequent survival of matrilineal descent under patrilocal residence ...' (Murdock 1949: 201). Residence, however, is another matter and appears to be 'peculiarly vulnerable to external influences'. Under matrilocal residence the

husband moves at marriage to live with his wife's relations, whereas under patrilocal residence the converse is true, but even when the residence rule becomes patrilocal, matrilineal descent groups (that regulate the inheritance of property, for example) may still exercise some influence over relations between husband and wife. But when matrilineal descent ceases to be the basis of any corporate groups it will obviously tell us little about the relations between husband and wife – hence, probably, the weak association between the descent system and levels of paternal confidence in Table 1.

We are concerned, then, with the social consequences of matrilineal residence in particular, and with matrilineal descent *groups* in general as indicators of what are likely to be the relations between the sexes and especially between husbands and wives. Since in all societies men exercise authority over women and not *vice versa*, matrilineal descent groups will face a dilemma that does not occur for patrilineal descent groups. As Schneider has said, whereas patrilineal descent groups can allow their women to pass outside their control at marriage and into the exclusive control of their husbands, matrilineal descent groups must continue to retain control over their women after marriage if the corporate existence of the descent group is to be maintained since membership in the group passes through these women. Thus 'The institutionalization of very strong, lasting, or intensive solidarity between husband and wife is not compatible with maintenance of matrilineal descent groups' (Schneider 1961:16), and 'There is always potential conflict between the bonds of marriage and descent; given exogamy, they are bonds which cannot coincide but pull each party to a marriage in different directions (ibid., 17). Because in this system of relations a man has only limited control over his wife, women have greater social freedom, and it is possible that this will involve greater sexual freedom as well in many such societies.

Matrilineal descent groups and, *a fortiori* matrilineal residence, do not occur at random but in a restricted range of socio-economic circumstances. Factors favourable to matrilineality seem to be: the superior contribution of women to production, in horticulture especially; the absence of movable property such as large livestock; relative peacefulness; and the absence of political centralization and bureaucratic structures. Matrilineal descent groups seem to be rare in societies with plough agriculture, or when there are large domesticated animals such as cattle and horses whether in the case of African horticultural societies or pastoralism; when there is large-scale irrigation co-ordinated by centralized bureaucratic authority; or where resources are only available to

roving bands of hunter-gatherers. Matrilocal residence, therefore (and the matrilineal descent groups which originate from this) seem to be rooted in horticultural economies, with stable localized resources. (These conclusions are summarized from Murdock 1949, Schneider 1961, Gough 1961 and Aberle 1961).

What can we conclude from all this about the relevance of inclusive fitness theory to the avunculate? The probability of female promiscuity is directly linked to the strength of the marriage bond and the husband's control over his wife's behaviour. We know that this is related to the existence of matrilineal descent groups, especially where these are also matrilocal, and this type of social organization is also clearly associated with certain socio-economic conditions. It may therefore be true that there will be a lower level of paternal confidence in the matrilocal or matrilineal situation than in the patrilocal, but this being so, the greater 'investment' of males in their sisters' children will be the consequence of this situation, and can have no value in explaining it. If this is denied, we must assume that, for reasons unknown, females are simply more promiscuous in societies with a horticultural base or which lack large domesticates and the plough, or which are politically uncentralized, and that this promiscuity leads to matrilineal groupings because of lowered confidence on paternity. This is an unconvincing hypothesis, to say the least.

But we have not yet considered the possibility that even the relatively few instances of 'investment' by mothers' brothers in their sisters' children may not involve any altruistic sacrifice on their part, or any real benefits to the recipients. Let us therefore examine a particular case in detail, that of the Trobriand Islanders, since it is the ethnographic example which Gaulin and Schlegel 1980 use to claim support for the inclusive fitness theory.

Weiner (1976:122, 190-191) states that adultery is common, and we know from both Malinowski and Weiner that women have considerable freedom, influence, and independence: it can therefore be assumed, within the limits of the present discussion, that 'paternal confidence is relatively low' (Gaulin and Schlegel, 1980: 306). There are matrilineal descent groups with patrilocal residence, and it is well established that a man each year gives half the produce of his yam garden to his married sister. (The complications of which brother gives to which sister etc. need not detain us here.)

Gaulin and Schlegel claim that '...it is clear that this prestation of food is a direct investment in a man's sister and her children' (*ibid.*, 306). But in order to count as an investment, such a prestation must, to some degree, increase the welfare of the recipients, and to count as an 'altruistic' investment, it must involve some cost to the

donor's welfare. In the case of the Trobriand Islanders, however, neither of these conditions is satisfied, for the following reasons.

1. Since this society has patrilocal marriage, in which the woman and her children live permanently with the husband who is their primary supporter, the rule which requires a brother to give half the produce of his yam garden to his married sister and her children necessarily and simultaneously requires his sister's husband (and supporter) to give away half *his* yams to *his* sister. Thus the application of the rule ensures, when we consider the society as a whole, that no household profits at the expense of any other, and that no altruism is therefore involved.

2. In the traditional society there was a surplus of garden produce: 'In gardening the natives produce much more than they actually require, and in any average year they harvest perhaps twice as much as they can eat... in olden days it was simply allowed to rot' (Malinowski, 1922:58). Yams, moreover, are only one among other sources of food, which also comprise taro, breadfruit, coconuts, sweet potatoes, bananas, sugar cane, mangoes, and wild fruit, as well as fish, crabs and molluscs, pork, and wildfowl. In such an environment, with an abundance of food available to all, just how can a man 'invest' in anyone by giving them food?

3. If the object of the prestations of yams from mothers' brothers to sisters' children is to increase their food supply, why should they confine their gifts to yams, and not include any of the other comestibles that are available? The reason is that the yam, because of its durability after harvesting (among other factors), is the preferred item of exchange in Trobriand society. The system of yam prestations from mother's brothers to sisters' children (artificially isolated by inclusive fitness theorists) is only a small part of an extremely complex network of gift exchange between a wide variety of kin, affines, and non-kin. Malinowski notes (1935: 192, 199) that it is essential for the prestige of an adult man that not he, but someone else should fill his store house with yams each year, and according to Weiner (1976:197) the primary significance of the yams given by the brother to his sister is their use by her husband as items *of exchange*, rather than food, to allow his wife in particular to compete in the system of female exchanges.

4. Gaulin and Schlegel also imply that because 'land use rights and both real and movable property also pass from mother's brother to sister's child...' (ibid., 306), this, too, is an investment. But here again no tangible benefits actually accrue to 'sister's children' versus 'own children' as the result of this rule. It is clear from Malinowski and Weiner that title to land does not govern land *use*, and that everyone has access to

sufficient land to meet their needs. Hence in the case of land inheritance, too, neither ‘investment’ nor ‘altruism’ is involved.

Despite the claims of inclusive fitness theorists that the avunculate is the result of lowered confidence in paternity, we have seen that while there does appear to be a relationship between matrilineality (and matrilocal residence in particular) and greater sexual freedom of women and hence, perhaps, lowered confidence in paternity, the degree of confidence of paternity is the result, not the cause, of the avunculate. Nor, in addition, is there any reason to suppose that merely because in some of these societies a brother makes gifts to his sister and her children, or leaves his property to them, their reproductive chances are thereby increased by comparison with those of his own children, or that any sacrifice of an altruistic nature by the mother’s brother is involved either.

This analysis of the avunculate has shown that social institutions cannot be directly related to any specific strategies or purposes of individuals, such as lowered confidence of paternity, proposed by inclusive fitness theorists, because social systems have properties of their own that are not reducible to the motives and actions of individuals. Inclusive fitness theorists, however, would reject such arguments on the grounds that they rely on the spurious notion of group selection, and we shall therefore consider this problem in the next section.

#### *4. Individual versus group selection*

The confusion of inclusive fitness theory over the social implications of ‘altruism’, ‘selfishness’, ‘cheating’, and ‘investment’ is compounded by the assumption that if one does not explain social institutions in terms of the aggregate of individual interests, the only other solution is to explain them as functioning in the interest of the society or group as a whole. But are we really forced to choose between individual and group selection?

The theory that a society is reducible to the aggregation of its individual members and their attempts to maximize their own interests has existed since men began consciously to reflect on the nature of human society. It can be found in one form or another from the thought of ancient Greece to the present day (see Lukes 1973 for a concise summary of the history of the idea). Alexander, however, implies that such a theory makes a new contribution to social analysis, and one that is peculiarly compatible with inclusive fitness. Writing of a paper delivered in 1972 by the distinguished

anthropologist G. P. Murdock, Alexander says:

It is remarkable that twenty-two years after the publication of *Social Structure* [1949], and without evidence that he knew of the revolution in evolutionary biology, Murdock renounced his approach there, stating that 'culture' and 'social system' are 'mere epiphenomena', and that human behaviour must be studied as the outcome of the interactions of individuals (Alexander 1979:48).

The theory that Murdock actually attacked in this paper however was that a 'society' or a 'culture' had needs or interests beyond those of individual members, whose behaviour could therefore be explained in terms of its contribution to the well-being or smooth functioning of that society or culture. This variety of 'holism', or 'social functionalism' as it is more accurately termed, has justifiably been the subject of severe criticism in recent years (see, for example, Popper, 1950; 1957; Hempel, 1959; Agassi, 1960; Jarvie, 1965; Buckley, 1967; Hallpike, 1972; 1973b; 1977a).

But it is quite possible to reject the assumption that human behaviour must be explained in terms of its functional value to 'society' without going to the other extreme and maintaining that human behaviour is to be explained solely in terms of the aggregate of individual interests and dispositions. Certainly Murdock in the paper referred to made no such extreme claims. Writing of the psychologist he said:

He has no understanding of the special conditions that have helped shape the complex forms of behaviour in which the social scientist is interested. He is totally incapable of accounting for differences in economy, in technology, in social and political organization, in ideology, or in value systems. If he attempts to do so on the basis of his knowledge of behaviour mechanisms alone he achieves only his own peculiar kind of mythology (Murdock, 1972:21).

And what applies to the psychologist applies also to the biologist. The point is that even though societies are made up of individuals these individuals construct systems of relations, and rules governing them, that operate in ways not under the control of any specifiable individuals, and which are often not readily comprehensible to them either. Social institutions (such as matrilineal residence, patrilineal descent groups, or plough agriculture) have structural properties of their own, and individual decision making has to accommodate to these. The apparent necessity of choosing between the interests of the individual or the interests of society as 'the' explanation of social behaviour is thus a false dilemma: societies do not have interests or needs or goals, since these are attributes only of living organisms, and societies are indeed in one sense made up of individuals, but it is still perfectly possible to explain certain features of societies in terms of the working of systems without any assumptions that the

features in question are intended by any specifiable individuals, or in their interests, or that they are functional for some super-organic *entity*, ‘the society’ or ‘the culture’. Thus in my research on the Tauade I was able to show that given certain basic characteristics of social interaction then certain consequences in terms of endemic conflict inevitably followed, but I also demonstrated that this high level of conflict was not ‘functional’ for Tauade society, nor in the interests of the individuals composing it.

In so far as inclusive fitness theory is a restatement of a naive individualistic reductionism with which social scientists and systems theorists have long been familiar it is simply an attempt to reinvent the wheel—and a square wheel at that.

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#### *Notes*

1. P.Kurland says that it is difficult to test the hypothesis empirically because ‘. . . much of the ethnographic literature contains reports on what the native informants say the natives say about what they do, or ought to do’ (1978:58). Rather than relying on such eminently unscientific evidence he therefore simply cites those anthropologists with whose conclusions he agrees.
2. My interest in the avunculate as a test of inclusive fitness theory was also stimulated by one of the referees for the first submitted version of this paper, who asserted that the evidence for the association between confidence of paternity and the avunculate was ‘overwhelming’.
3. There is, of course, much more to the ‘avunculate’ than this. For example, it has often been noted that in patrilineal societies where the father has jurial authority over his children there may be complementary ties of affection or of a mystical nature between the children and their mother’s brother. But for the purposes of the present discussion we shall confine ourselves to those cases where the mother’s brother confers, or appears to confer, practical benefits on his sister’s children that are comparable or superior to those of their father.

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