**Chapter 11 Supplementary**

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**11.1 “r” values and sibling affection**

It is an easily observed fact that although sibling rivalry exists, siblings often form very close bonds with each other that last throughout life. This could be taken as an obvious example of kin selection: humans taking an altruistic interest in their kin. The proximate mechanism may be co-socialisation (and the triggering of affection towards predicted siblings) or the tendency of parents to encourage cooperation amongst their offspring.

But in addition to any postulated developmental mechanism, in all cultures there are social conventions that bind families together both legally and morally. Evolutionary imperatives and social conventions are of course not mutually exclusive (in particular the latter may be the means of achieving the former) but nevertheless it would be instructive to disentangle the relative effects of biological factors and cultural norms. In relation to this, a study by two sociologists William Jankowiak and Monique Diderich (2000) on a polygamous Mormon community based at Angel Park in the south west of the USA has provided some interesting findings. In these communities the head of the family is officially the father who takes several wives. The official dogma on family life (reinforced and promulgated through schooling and church services) is that social cooperation and harmony within the family are highly important and that the children of all the father’s wives (which will be full siblings and half siblings) have equal status. These researchers interviewed 70 adults who had grown up in such families and recorded various measures of how close they felt to their full and half siblings.

As Figure 11.1 shows more affection was felt for full than half siblings, despite the family philosophy that all should be equal. The proximate mechanism for this effect is not clear. It is likely however that mothers (possibly unconsciously) encourage more affection and cooperation between their own biological children than between her children and those of her husband’s other wives.

**Figure 11.1 Measures of affection and solidarity between full and half siblings in a religious community**

Source: Data taken from Jankowiak, W. and Diderich, M. (2000) ‘Sibling solidarity in a polygamous community in the USA: unpacking inclusive fitness.’ *Evolution and Human Behaviour* 21: 125–39, p. 133.



**11.2 The distribution of wealth: inheritance and kin investment.**

Wealth is, in a sense, the embodiment of indirect reciprocity. A coin or a note is a physical symbol that you are owed something for your previous efforts. You may have exchanged your labour for money with an employer, the money that was handed to you can now purchase the labour of someone else and so it goes on. You could of course hand over your money to someone else, such as a friend or a relative, without any obvious future personal reward. Such is the situation when people make bequests in their wills. But we don’t hand over our hard-earned wealth beyond the grave at random, and selectionist thinking can be applied in this context too. This section examines patterns in how people divide up their estate and then how inheritance rules and practices in different cultures are related to marriage systems. This latter sub-section provides an interesting example of how a cultural practice (rules of inheritance) can be related to genetic self-interest.

Inheritance of Wealth - practice in a contemporary Western culture.

In the legal system of most Western cultures an individual has considerable freedom of choice in deciding how to distribute their wealth in bequests to relatives and friends following death. It is reasonable to suppose, for the same reasons outlined above, that in our evolutionary past the allocation of resources following death would have significantly affected an individual’s inclusive fitness. So are there vestiges of any adaptive preferences in behaviour today? In attempting to answer this, Smith, Kish and Crawford (1987) analysed the bequests of a random sample of 1000 individuals recorded in the Probate Department of the Supreme Court of British Columbia. Their data were used to test four predictions:

1. Individuals will leave more of their estate to kin and spouses than to unrelated individuals. This is hardly a surprising prediction from general knowledge but it follows from kin selection theory in the sense that resources left with kin can improve inclusive fitness; resources left with genetically unrelated spouses may still find their way to kin eventually.

2. Individuals will leave more of their estate to close kin (high r) than to distant kin (low r)

3. Individuals will leave more of their estate to offspring than to siblings. Although a son or daughter have the same r value of 0.5 as a bother or sister of the deceased, it is likely that a bequest to say a son will enhance his reproductive value more than that to a brother. If a bequest were to be made to a brother or sister they are both likely to be past reproductive age, or in a position where wealth has limited effect on reproduction.

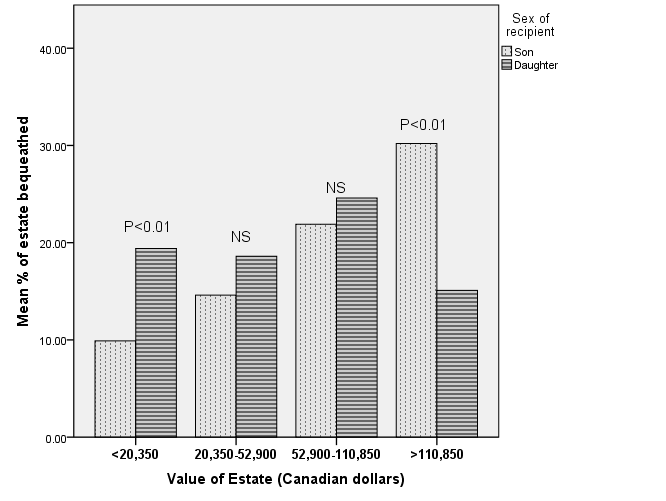
4. There will be a male bias in bequests to children of wealthy individuals and a female bias to children of poorer individuals. The logic of this prediction for male offspring is similar to Hartung’s hypothesis discussed below: wealthy sons were once better able to secure more wives and hence more offspring compared to poor sons, whereas wealth probably had a smaller effects on the reproductive output of daughters. The female bias is predicted from the fact that in mildly polygynous mating (which may have represented our ancestral state) poor sons may not secure any wives, and so produce no grandchildren, but poor daughters may mate with a man who already has a wife.

Predictions 1-3 were confirmed by looking at how the percentage of bequests was distributed according to closeness of kin.

To test prediction four, the estates of the 1000 deceased individuals were split into four wealth bands (Figure 11. 2) Again, the data supports kin selection theory. Wealth parents tended to bequeath a significantly larger portion of their estate to sons compared to daughters, and vice versa for poorer parents.

**Figure 11.2 Distribution of Estate to Offspring According to Sex.**

Source: data from Smith, M., Kish, B. J. and Crawford, C. B. (1987) ‘Inheritance of wealth as human kin investment.’ *Ethology and* *Sociobiology* 8: 171–82.



Inheritance Rules and Marriage Systems

Kin selection theory tells us that parents will “invest” biological resources in their kin because kin represent the passport that will carry their genes into future generations.

Hartung (1976) postulated that where wealth correlates with reproductive success, then parents should pass on their wealth to male rather than female offspring. This follows from the fact that wealth can be used by a male where mating is polygynous to increase his number of wives and hence number of children. In monogamous mating contexts the bias in favour of males should be less pronounced: it is no use leaving resources preferentially to sons if the culture does not permit more than one wife (although it may help them secure re-marriage should they lose a first wife). Hartung tested these ideas in a survey of 411 cultures (Hartung, 1982). He found a strong male bias in inheritance where polygyny was common (Table 11.1).

Table 11.1 Male bias in inheritance system of a culture according to mating behaviour

Data summarised from Hartung, J. (1982) ‘Polygyny and the inheritance of wealth.’ *Current Anthropology* 23: 1–12.

|  |  |
| --- | --- |
| Mating System | Percentage Cultures with strong male bias |
| Monogamy | 58 |
| Limited Polygyny | 80 |
| General Polygyny | 97 |

Hartung did take pains to address the problem of independence of cultures and hence data points (so-called Galton’s problem), but Mace and Cowlishaw ( 1996) have suggested that a phylogenetic approach provides a better series of controls. They traced back 261 cultures in 11 language families to their inferred ancestral state of mating behaviour. They then looked for cases where the marriage system, or inheritance rules, or both changed as the cultures evolved. Where change did occur, the end states of inheritance bias and marriage system after the transition were recorded. The data are shown in Table 11.2

**Table 11.2 End States of Marriage System and Inheritance Rules Following a Cultural Transition**

Source: Data summarised from Mace, R. and Cowlishaw, G. (1996) ‘Cross-cultural patterns of marriage and inheritance: a phylogenetic approach.’ *Ethology and Sociobiology* 17: 87–97.

|  |  |  |  |
| --- | --- | --- | --- |
| End State of Inheritance rule | End state of marriage system | | |
|  | Monogamy  percentage | Limited Polygyny  percentage | General Polygyny  percentage |
| Strong Male Bias | 25 | 44 | 87 |
| Weak or no Bias | 75 | 56 | 13 |
| No. of Cultures : | 20 | 18 | 16 |

The work of Mace and Cowlishaw supports the idea that marriage patterns and inheritance rules evolve together in ways that are adaptive. The evolution of monogamy is strongly associated with an absence of sex-biased inheritance rules. In contrast, where general polygyny evolves it is usually accompanied by a strong male bias in inheritance. It is worth noting that whereas Hartung found that monogamy was roughly equally associated with male bias and absence of male bias, this revised phylogenetic approach showed that an evolved association between monogamy and strong male bias is less common (25percentage). In summary, if you live in a culture where polygyny is common and you are rich it would serve your biological interests to leave your wealth to sons: with wealth they have a chance to obtain more wives and so produce more grandchildren. If marriage and sexual relations are largely monogamous then it is not so crucial.

The studies of Mace and Cowlinshaw (1996) and Smith et al (1987) are worth comparing in that they illustrate how evolutionary psychology may illuminate different facets of human cultural behaviour. In the Mace and Cowlinshaw study it is the cultural norms and rules that reflect fitness-maximising behaviour. This is evidence that is germane to the much larger question of the relationship between genes and culture pursued in the next section.

It may seem as if male inheritance only benefits the inclusive fitness of fathers, but of course mothers benefit too from wealth passing to a son who thereby becomes reproductively successful. The Smith et al study shows how in societies where cultural conventions are more flexible, individuals still behave through “free choice” so as to maximise their inclusive fitness. It is interesting that the bias to male offspring from wealthy parents probably had adaptive value 100,000 years ago, and in polygynous cultures may still have, but probably has little long-term effect in Western cultures where monogamy is legally enforced.

Paternity certainty, patrilineality and matrilineality.

The passing on of wealth has traditionally been divided by anthropologists into two systems: patrilineal and matrilineal. In patrilineal systems wealth is passed down the paternal line, usually from father to son; in matrilineal systems the wealth is passed down from mothers to sons or daughters or more often from fathers to their sister’s son’s.

In about 10percentage of well documented societies men have obligations of care towards their sister’s children. In these same societies the men have few obligations towards their wife’s children. If we compare the existence of matrilineal societies with patrilineal some significant patterns emerge:

* There are no societies recorded where a wife is obliged to look after her brother’s children.
* There are no societies where a man is obliged to take care of brother’s children
* There are no societies where women are obliged to take primary care of their sister’s children.

To understand this pattern and the conditions tending to promote matrilineality we can consider the degree of relatedness in families where there is paternal uncertainty. The degree of relatedness of a man to his son is 0.5p, where p= the probability of paternity (recall that the coefficient of genetic relatedness between parent and offspring is 0.5, see section 2.5.2). If p = 1 (the assumed father is really the biological father of the child) then r = 0.5; but if p = 0, then the r value between father and son is zero. A man’s relatedness to his sister (by the same mother) is 0.25 +0.25p. The 0.25 is a reflection of the fact that the man is reasonably assured that he and his sister share the same mother; the fact that p is multiplied by 0.25 is a reflection of the fact they may have different fathers. In this case, if p=1 then r between brother and sister = 0.5; but if p= 0 then the r value is still finite at 0.25. Following the same logic we can see that a man’s relatedness to his sister’s children is 0.5(0.25 +0.25p). It follows that a man is more related to his sister’s children if :

0.5(0.25 +0.25p) >0.5p

That is when p<0.33

In a study of 1985, John Hartung looked at the distribution of matrilineal and patrilineal inheritance in 70 well documented cultures. His results are shown in Figure 11.3.

Figure 11.3 Distribution of matrilineal or patrilineal inheritance according to paternity certainty

Source: Data plotted from Hartung, J. (1985b) ‘Matrilineal inheritance: new theory and analysis.’ *Behavioral and* *Brain Science*. 8: 661–8



Hartung’s results are consistent with the idea that men will invest in their sister’s children in cultures where paternity certainty is low since in these cultures men can still be assured of an r value of at least 0.25 with the beneficiaries of their wealth

**11.3 Eyes and God**

Could pro social behaviour be enhanced by the belief that eyes are watching even without a stimulus image? Many public places carry signs that CCTV is in operation in the assumption that this will dampen criminal behaviour. But what if, for example, people believe their actions are being watched and monitored by some invisible supernatural agency. Quentin Atkinson and Pierrick Bourrat (2011) looked at subjects’ expression of the acceptability of moral transgressions in relation to their beliefs about the nature of God (such as a vague life force or a personal God who watches and intervenes- Deism or Theism in traditional terms) and the prospect of punishment and reward after death. Their “supernatural monitoring hypothesis” was supported when they found that belief in a God who monitors and watches over human behaviour was significantly positive correlated with their strength of belief in the unjustifiability of various moral transgressions. This is not the same, of course, as actually observing enhanced pro social behaviour but such work does support the more general notion that religions may provide fitness advantages to people living in groups by enhancing group cohesions and trust and by reducing the frequency of free riding

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