Evidence for Genetic Similarity Detection in Human Marriage

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Previous theoretical and empirical studies have shown that individuals may act to the benefit of others of similar genotype. We argue that the ability to discriminate among individuals of varying degrees of relatedness is prevalent in many species, and that the tendency to favor relatives can be considered a special case of a tendency to favor those of similar genotype. The phenomenon of assortative mating can be explained in this way, but new evidence capable of disproving this conjecture is not easily obtained. We have reanalyzed three previously reported studies of heritability and assortative mating in humans, and show that there is a greater degree of assortative mating on more highly heritable traits, in accordance with the prediction.

Key Words: Assortative mating, Heritability, Genetic similarity, Humans, Kin recognition.

We have previously argued (Russell et al. 1984; Rushton et al. 1984) that humans and other animals are able to detect genetic similarity between themselves and others. Furthermore, we have suggested that this ability has important implications: it may be involved in processes such as kin recognition, and may also play a part in human relationships such as marriage and friendship.

Recent work on kin recognition has demonstrated that animals from a wide variety of species are indeed capable of distinguishing kin from nonkin and, in some instances, performing fine discriminations among conspecifics of varying degress of relatedness (see, for example, Greenberg 1979). Much of the relevant evidence is reviewed by Holmes and Sherman (1983). Although in many cases the mechanisms involved in kin recognition may be complex and its possible function in some species far from clear, there seems to be little doubt that the discriminatory ability exists.

What are the possible consequences of the ability to detect genetic similarity? According to kin selection theory, altruism should be directed towards those of similar genotype in order that an altruism gene succeed (Hamilton 1964). Theoretical models such as those developed by Boyd (1982) and Samuelson (1983) specify some of the conditions under which this can occur. The detection of genetic similarity may even be of advantage to reciprocal altruists, who *need* not share any genes (Trivers 1971), although the conditions for reciprocation are more easily fulfilled if the interactants are relatives (Axelrod and Hamilton 1981).

The ability to detect genetic similarity may influence more than just altruistic behavior. It may be used to avoid inbreeding, as reported in free-living populations of primates (Packer 1979; Pusey 1980), or to optimize mate choice by the selection of a partner of some intermediate degree of similarity (Bateson 1983).

In many species, the choice of sexual partner reflects the phenomenon known as homogamy or assortative mating. Assortative mating ensures the simultaneous reproduction of two individuals who are, by definition, more similar

Received May 9, 1984; accepted March 4, 1985.
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Ethology and Sociobiology 6: 183–187 (1985)

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0162-3095/85/$03.30

cients, provided that heritability and assortative mating coefficients are simultaneously assessed on the same sample, using a set of traits that appear homogeneous in nature. Given the argument that individuals will associate with others who are genetically similar, we predict, in contrast to Thiessen and Gregg, that assortative mating will occur more on the basis of traits of high heritability.

A possible objection to this use of human assortative mating coefficients is that if husband-wife similarities are observed some time after marriage, the resemblance could have been developed as a result of mutual interaction over time. As we shall see, however, assortative mating can occur on the basis of measures obtained prospectively (Hill 1973). Guttman (1970) also obtained an indirect measure of the length of marriages by assuming that there was a relationship between length of marriage and the age of the first-born child. Partialing out this age variable produced no substantial difference in the between-mate correlation. Griffiths and Kunz (1973) studied the degree of physical resemblance between spouses, using photographs whose similarity had been rated by independent judges, and found no tendency for resemblance to increase as a function of the duration of the marriage. Finally, Eysenck and Wakefield (1981) found that similarity on a variety of psychological characteristics does not change as a function of the length of the marriage. All of these findings support the contention that people pick similar partners to marry, as opposed to the possibility that individuals in a marriage grow to resemble each other.

The three separate studies on humans discussed below fulfill the necessary criteria described above: that is, heritability estimates for comparable traits and assortative mating coefficients obtained from the same sample. In these studies, heritabilities were estimated on the basis either of parent–offspring or of midparent–offspring correlations.

The first two studies to which we refer (Guttman 1970; Susanne 1977) calculated heritabilities from parent–offspring correlations. Measured this way, the heritability is the observed correlation as a proportion of the correlation that would be found if the character were completely inherited, that is, if all the variance were additive genetic (Falconer 1981). To remove the inflating influence of assortative mating on the parent–offspring correlation, these studies based estimates of heritability (h^2) on the formula $h^2 = 2rpo/(1 + rpp)$, where *rpo* is the parent–offspring correlation and *rpp* is the correlation between the parents. Error variance in the assortative mating coefficients, therefore, would tend to produce negative correlations between h^2 and *rpp*. The predicted effect has to be sufficiently robust to overcome this problem.

In the first of the studies to be considered, Guttman (1970) calculated heritabilities of five visual number judgments on a large human sample of Asian and North African origin. Between-mate correlations were also obtained for the same five tasks. Each person was asked to judge the number of marbles or ping-pong balls contained in a transparent plastic bag; the numbers of objects to be judged ranged between 5 and 34. Using Pearson's correlation coefficient, we found that the five heritability estimates given by Guttman correlate positively with the degree of assortative mating shown by parents on these tasks, but that the correlation just fails to attain significance ($r = 0.729$).

In the second study, Susanne (1977) obtained heritabilities of 36 anthropometric traits in a Belgian sample. Heritability estimates were calculated on the basis of parent–offspring correlations, as in the study by Guttman, on the grounds that this method provides a good estimate of the relative influence of additive genetic variance in the total phenotypic variance. Those body measurements based on the osseous part were found to have higher heritabilities than those based on the muscular or adipose part, as would be expected if the latter were more greatly influenced by environmental factors. Again, we calculated the correlation between estimates of h^2 and *rpp*. The resulting coefficient is significant ($r = 0.358$, $p < 0.025$, one-tailed).

The third study (Hill and Hill 1973) estimated the heritabilities of the 11 scales of the Minnesota Multiphasic Personality Inventory from midparent–offspring correlations, avoiding the need to correct for assortative mating. Unusually, the personality scales were administered to parents and offspring at comparable points in their life cycle, thus correcting for possible developmental changes with age. This procedure also has the merit of avoiding the underestimation of phenotypic variance that may occur when individuals within a family are tested simultaneously (since they are at that time sharing a

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