

DIFFERENTIAL K THEORY: THE SOCIOBIOLOGY OF INDIVIDUAL AND GROUP DIFFERENCES*

J. PHILIPPE RUSHTON

Department of Psychology, University of Western Ontario, London, Ontario N6A 5C2, Canada

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Summary—Differential K Theory is proposed to help systematize individual and group differences in life histories, social behaviour and physiological functioning. K refers to one end of a continuum of reproductive strategies organisms can adopt, characterized by the production of very few offspring with a large investment of energy in each. At the opposite extreme is the r-strategy in which organisms produce a large number of offspring but invest little energy in any one. Between-species comparisons demonstrate that these reproductive strategies correlate with a variety of life history traits including: litter size, birth-spacing, parental care, infant mortality, developmental precocity, life span, intelligence, social organization and altruism. As a species, humans are at the K end of the continuum. Some people, however, are postulated to be more K than others. The more K a person is, the more likely he or she is to come from a smaller sized family, with a greater spacing of births, a lower incidence of DZ twinning, and more intensive parental care. Moreover, he or she will tend to be intelligent, altruistic, law-abiding, behaviourally restrained, maturationally delayed, lower in sex drive and longer lived. Thus diverse organismic characteristics, not otherwise relatable, are presumed to covary along the K dimension. Group differences are also hypothesized, such that, in terms of K: higher socio-economic > lower socio-economic; and Mongoloids > Caucasoids > Negroids.

INTRODUCTION

Numerous individual differences in personality and social behaviour have been investigated and found to be substantially heritable (Goldsmith, 1983; Loehlin and Nichols, 1976; Rushton, 1984a). Surprisingly few theoretical accounts, however, have been proposed to systematize these diverse biosocial differences (cf. Eysenck, 1981). The current paper provides such an account. Using concepts from evolutionary biology, it is postulated that the degree to which an individual has inherited a K reproductive strategy underlies multifarious characteristics concerning life history, social behaviour and physiological functioning.

LIFE HISTORY ANALYSIS AND THE r/K CONTINUUM

Life cycle traits and their variations began to receive increasing study after a paper by Cole (1954) questioned why some species engaged in the extreme reproductive strategy of semelparity, expending all energy in a burst of reproductive effort and dying shortly thereafter, while other species engaged in iteroparity, reproducing at regular intervals over the life span. Since then much additional information on life histories has been amassed. To generalize, organisms can adopt any reproductive strategy between two extremes: produce a great many offspring but invest little energy in any one, or, produce very few offspring but invest large amounts of energy in each. Using the symbols of population biology, these extremes are designated r-strategy and K-strategy, respectively (Wilson, 1975). Oysters, producing 500 million eggs a year exemplify the r-strategy, while the great apes, producing only one infant every 5 or 6 years, exemplify the K-strategy.

Comparative studies of the breeding patterns of herbaceous plants (Gadgil and Solbrig, 1972), birds of prey (Newton, 1977), and a variety of mammalian species (Eisenberg, 1981), have found these reproductive strategies to be correlated with other features of the organism's life history. Following Pianka (1970), Wilson (1975) and Barash (1982), these are summarized in Table 1. While each of the life history characteristics might independently contribute to fitness, the important point

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Table 1. Some life history, social behaviour and physiological differences between r- and K-strategists (following Pianka, 1970)

r-strategist	K-strategist
<i>Family characteristics</i>	
Large litter size	Small litter size
Short spacing between births	Long spacing between births
Many offspring	Few offspring
High rate of infant mortality	Low rate of infant mortality
Low degree of parental care	High degree of parental care
<i>Individual characteristics</i>	
Rapid rate of maturation	Slow rate of maturation
Early sexual reproduction	Delayed sexual reproduction
Short life	Long life
Small body size	Large body size
High reproductive effort	Low reproductive effort
High energy utilization	Efficient energy utilization
Low intelligence	High intelligence
<i>Population characteristics</i>	
Opportunistic exploiters of the environment	Consistent exploiters of the environment
Dispersing colonizers	Stable occupation of habitat
Variable population size	Stable population size
Competition variable, often lax	Competition keen
<i>Social system characteristics</i>	
Low degree of social organization	High degree of social organization
Low amounts of altruism	High amounts of altruism

is that they are expected to covary along a single axis across species. Species are, of course, only relatively r and K. Thus rabbits are K-strategists compared to fish but r-strategists compared to humans.

One influential scheme proposed to account for the evolution of r- and K-*strategies* is r- and K-*selection* (MacArthur and Wilson, 1967; Wilson, 1975). Originating in the mathematics of population biology, r stands for the maximal intrinsic reproductive rate, or the natural rate of increase in a population temporarily freed from resource limitations. Here, selection is said to be for the ability to reproduce rapidly and opportunistically, qualities hypothesized to evolve in unstable, unpredictable environments. K, on the other hand, stands for the carrying capacity of the environment, or the maximum population a species can maintain under certain fixed conditions. Here, selection is said to be for the ability to successfully compete under conditions of scarce resources, a quality hypothesized to evolve in stable, predictable environments.

Anomalies exist with the account given above. At the conceptual level, the terms r and K have been used variously in the literature; sometimes to characterize the demands of natural selection, and at others, the life history attributes resulting from the selection (Stearns, 1977). At the empirical level, deviations occur from the positive correlations expected. A negative correlation between body size and parental care, for example, has been found in marine invertebrates ranging from oysters to octopi (Strathmann and Strathmann, 1982). Despite anomalies, many evolutionary biologists, having reviewed the literature, find the r/K continuum useful in organizing information on life history traits (Barash, 1982; Daly and Wilson, 1983; Dawkins, 1982; Wilson, 1975). In this paper I will use the r/K continuum to refer to reproductive strategies and their associated features, and leave in abeyance questions regarding the selection pressures which brought them about [see Warner (1980) for a discussion].

WITHIN-SPECIES DIFFERENCES IN r AND K

Sociobiologists focus primarily on the evolutionary origins of between-species differences. Yet, clearly, the theory of evolution requires that there be a genetic basis to the within-species differences in the behaviours studied (Plomin, DeFries and McClearn, 1980). The question thus arises as to whether the r/K continuum also applies to within-species differences. Several studies have suggested it does.

Gadgil and Solbrig (1972) examined within-species differences in plants; specifically in the common weedy dandelion *Taraxacum officinale sensu lato*. They measured an important characteristic of r and K, the proportion of resources devoted to reproductive tissues. These individual

differences were examined under a variety of growth chamber, greenhouse and experimental field conditions. Among populations of naturally occurring dandelions it was found that those biotypes growing on lawns more frequently walked on, mowed or otherwise disturbed (i.e. subjected to r-selection) had, as expected, a higher seed output and a higher proportion of biomass devoted to reproduction than those dandelions growing in less disturbed areas. When the plants were subsequently grown from seed under greenhouse experimental conditions using a variety of temperatures and soils, it was demonstrated that the differences were genetically fixed. Whereas the r-selected biotypes allocated more resources to the production of seeds and reached reproductive maturity faster (they bloomed a year earlier), the K-selected biotypes allocated resources to leaf biomass at the expense of seed production, thus gaining a direct competitive advantage in conditions of higher density through their capacity to shade out the r-types.

In a 5-year examination of the fluctuating population cycles of field mice, demographic changes were found to be related to genetic markers predictive of r- and K-behaviour (Krebs, Gaines, Keller, Myers and Tamarin, 1973). Examining two species of *Microtus* (*M. pennsylvanicus* and *M. orchragaster*) through a combination of naturalistic observation, fencing experiments, dispersal studies and polymorphic serum protein analysis, the authors showed that the genotype most responsible for speedy population growth tended to be the earliest breeders and most dispersing when population density was high (r-strategists). The segment of the population which remained behind were individuals selected for competitive spacing behaviour under high population density (K-strategists).

In a study on fish, five populations of American shad (*Alosa sapidissima*) were observed at different latitudes on the Atlantic coast (Leggett and Carscadden, 1978). Reproductive strategies were found to vary: northern populations, spawning in environments that are thermally harsh and variable, allocate a greater proportion of their energy reserves to migration, thereby ensuring higher post-spawning survival. This was accomplished by reducing the energy allocated to gonads. These K-shad were larger, older at maturity, more iteroparus (repeat spawners), and less fecund (producing 3–5 times fewer eggs), than the semelparus (dying after reproduction) r-shad.

In selective breeding experiments with flies, *Drosophila pseudoobscura*, and milkweed bugs, *Oncopeltus fasciatus*, Taylor and Condra (1980) and Hegman and Dingle (1982), respectively, also presented evidence for the K Theory. Hegman and Dingle, for example, indexed body size, age at first reproduction, number of eggs per clutch, interclutch interval and developmental time to adulthood. To estimate the additive genetic variance for each of these characteristics and the additive genetic covariances among them, they employed half-sibling comparisons. The results indicated that each of the individual traits was heritable and, moreover, because significant genetic covariances were found among traits, that selection for any one trait was likely to lead to selection for the others.

K AND THE ORIGIN OF MAN

The evolution of mammalian life histories, behaviour patterns and social systems was recently codified by Eisenberg (1981) from the perspective of K Theory. He demonstrated that the mammalian radiations showed an increasing trend toward K. Consistent with historical and comparative data, he discussed how competition over resource bases could select for long life, small litters and trends toward iteroparity, which, if the resource base then varied from year to year, could select for increased percentage of life span spent in social learning. This, in turn, could lead to high encephalization, with concomitant central nervous system growth in a long gestation period and continuing development after birth, which then could select for delayed sexual maturation and the creation of a complex interdependent social grouping with high degrees of altruism.

Species adopting an extreme K-strategy, however, may risk extinction. Great apes, for example, produce only one infant every 5 or 6 years, a dangerously low reproductive rate for ensuring survival. Recently Lovejoy (1981) proposed a K-selection model of the evolutionary origin of *Homo sapiens* that explained both how humans evolved a system to produce a greater number of offspring than the great apes, thus avoiding the danger of extinction as well as developing the characteristics that separate man from apes, including bipedality, reduced anterior dentition, a large neocortex, material culture and unique sexual and reproductive behaviour. To produce a greater number of

offspring, while otherwise increasing a K-strategy, Lovejoy (1981) proposed that humans successfully adopted a feedback loop based on a move to pair-bonding. Specifically, pair-bonding results in females and infants being provided with food by males, which results in females not having to be so mobile, which results in females being able to raise more children (e.g. two or three young ones at a time). This requires males to carry food back, which requires a bipedal gait to free the hands for carrying food back, which requires pair-bonding to increase the probability that the food the males bring back is being used by their own genetic offspring. Moreover, pair-bonding may have led to a reduction in male-male competition for mates, thus making cooperation and wider social bonding possible.

By a series of adaptations such as those listed above, man has become the most K of all the primates. As Lovejoy (1981) pointed out, the order primates display a *scala naturae* from lemur to macaque to gibbon to chimp to man (see Fig. 1), in which there is a trend toward K with prolonged life span, prolonged gestation, single births, successively longer periods between pregnancies and developmental delay. With each step in the *scala naturae*, populations devote a greater proportion of their reproductive energy to subadult care, with increased investment in the survival of fewer offspring. As Fig. 1 demonstrates, the between-species correlated characteristics place man at the extreme of this *scala naturae*. Although it is no longer fashionable to view man as the 'most developed' of species, this once traditional view gains novel support from the perspective of an r/K dimension. K and intelligence are certainly related. K goes hand in hand with the increasing specialization of vertebrates through time. As Johanson and Edey (1981) summarize: "More brains, fewer eggs, more 'K'" (p. 326).

INDIVIDUAL DIFFERENCES IN K AMONG HUMANS

It is reasonable to assume that some humans adopt a more K-strategy than others. Such a view has been proposed recently by several writers, including Weinrich (1977) and Weigel and Blurton-Jones (1983), in the context of class and race differences in reproductive behaviour, and Reynolds and Tanner (1983) in the context of the role of religious beliefs on reproductive success. In these accounts, individual differences in K are said to reflect different processes of socialization, with low-income people adopting an r-strategy and high-income people adopting a K-strategy due to different perceptions of the predictability of their environments. What is being proposed here, however, is that some of the variance in K among humans is under genetic influence and that K-behaviour is associated with a constellation of personality attributes, all deeply embedded in evolutionary history.

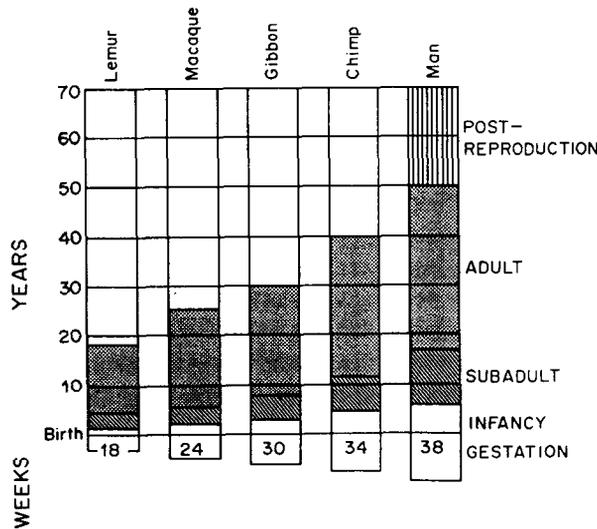


Fig. 1. Progressive prolongation of life phases and gestation in primates. Note the proportionality of the four indicated phases. The post-reproductive phase is restricted to man. Source: Lovejoy (1981); Copyright 1981 by the American Association for the Advancement of Science.

Differential K Theory makes several falsifiable predictions, some of them not obvious, and offers the potential to substantially order a variety of topics. The most obvious predictions derive from Table 1 and Fig. 1 and pertain to life history traits, social behaviour and physiological functioning. Consider first the family system. The more K the family, the more stable it will be, the less likely it is to have dizygotic twins (a measure of 'litter size'), the greater the spacing between births, the fewer the total number of offspring, the lower the rate of infant mortality and the better developed the parental care. Consider now individual physical development. The more K the person, the longer the period of gestation, the higher the birthweight, the more delayed the onset of puberty, the older the age at first reproduction, the larger the final body size, the smaller the reproductive structures and the longer the life. Finally, consider individual personality and social behaviour. The more K the person, the higher the intelligence, the more altruism manifested, the greater the law-abidingness, the lower the overall activity level and the lower the sex drive. Significant correlations are predicted to occur among all of the above indices of K.

Many of the individual traits associated with the r/K continuum have been shown to be heritable in humans. In regard to family size and structure, the production of both dizygotic twins and large families have been shown to be genetically influenced (Bulmer, 1970). With respect to maturational variables, the onset of puberty and menopause (Bouchard, 1982), the rate of growth from 3 months to 15 years in height and intelligence (Wilson, 1983), the age of first sexual experience (Martin, Eaves and Eysenck, 1977), the onset of degenerative diseases associated with ageing (Omenn, 1977) and longevity itself (Carmelli and Andersen, 1981), have all been shown to be heritable. As for personality, numerous studies and reviews have documented the pervasiveness of genetic influence on a wide range of normal and abnormal traits, including: activity level, aggression, altruism, anxiety, criminality, dominance, extraversion, intelligence, locus of control, manic-depressive psychosis, political attitudes, schizophrenia, sexuality, sociability, values and vocational interests (Goldsmith, 1983; Loehlin and Nichols, 1976; Plomin, 1983; Rushton, 1984a; Scarr and Kidd, 1983).

The crucial predictions from Differential K Theory, however, concern the interrelationships *among* these (partly) inherited traits. An exciting if open-ended possibility is that one basic dimension—K—underlies much of the field of personality. Attempts to reduce the enormous number of trait terms to the minimum few, through factor analysis, for example, have of course been made in the past. Thus Cattell (1965) proposed that 16 dimensions are sufficient to capture the essence of human personality, while Eysenck (1981) argued that three, excluding intelligence, will suffice. We already know, therefore, that many traits of human personality are related.

In the remainder of this section some of the interrelationships of primary interest that might be expected and/or have been found to date will be reviewed. The discussion will be organized by the following topics: family structure, intelligence, sexuality, extraversion, rule-following behaviour and altruism. Although some areas will necessarily be more speculative than others, it is hoped to demonstrate the heuristic potential of the theory for ordering many hitherto unrelated observations.

Family structure

As mentioned, the production of both dizygotic twins and large families have been shown to be genetically influenced (Bulmer, 1970). Moreover, the tendency to produce DZ twins is related to several other K dimensions. Compared to mothers of singletons, mothers of DZ twins typically have a lower age of menarche, a shorter menstrual cycle and a higher number of marriages (Wyshak, 1981), a higher rate of coitus (James, 1972), more illegitimate children (Eriksson and Fellman, 1967), a closer spacing of births and a greater fecundity (Allen, 1981). It is, of course, well-known that such family structure variables as marital break-up and single parenting are related to several non-K characteristics such as child abuse, lower intelligence and juvenile delinquency.

Intelligence

Many studies show a negative relation between intelligence and family size (Zajonc, Markus and Markus, 1979). Others have found that when family size is held constant, birth spacing is important: the greater the spacing between births, the higher the intelligence of the children (Lancer and Rim, 1984). Still other studies have shown that intelligence is positively related to such varied

indices of K as brain size, gestation period, low activity level, law-abidingness, honesty, height and longevity (Jensen, 1980, 1984).

Sexuality

Freud (1930) in *Civilization and Its Discontents* conjectured the existence of a positive correlation between restrained sexuality and the production of culture. He explained this in terms of the psychodynamics of repression and sublimation. Differential K Theory predicts it in terms of correlated traits. One can allocate energy to reproductive effort either directly through sexual behaviour or indirectly through the ability to compete when resources are scarce. It would be instructive in this regard to calculate the correlation between indices of an individual's intelligence and the size of his or her reproductive structures and strength of sex drive. The latter has been shown to be heritable and related to age of first sexual intercourse, intercourse frequency and total number of partners (Eysenck, 1976). Human sexuality has also been related to personality. Thus Eysenck (1976) found that, compared to introverts, extraverts typically have intercourse earlier, more frequently and with more different partners. These findings have been replicated by Barnes, Malamuth and Check (1984).

Extraversion

Findings in the above section suggest that extraverts may be less K than introverts. It would be instructive to see whether extraverts spaced their children less far apart than introverts and provided less parental care. Many of the traits associated with the dimension of introversion–extraversion seem differentially related to K. Thus extraverts are said to be 'active', 'impulsive' and 'changeable', while introverts are 'careful', 'thoughtful' and 'reliable' (Eysenck, 1981). Extraversion, of course, has been linked to an extremely wide variety of variables ranging from central nervous system functioning to occupational choice, attitudes and values (Eysenck, 1981). Extraverts tend toward moral permissiveness, liberalism, people-oriented occupations and an enjoyment of adventure, excitement and play. Introverts tend to be sober and serious-minded, liking academic, scientific and other theoretical pursuits (Wilson, 1981). With respect to academic success, evidence suggests that while extraverted children perform better in school up until puberty, after this introverts gain a progressive advantage (Anthony, 1977; Eysenck and Cookson, 1969), and Jensen (1980) reported that introverts perform faster on reaction-time measures of intelligence than do extraverts. Finally, there is the evidence that extraverts are less conditionable and more criminal than introverts (Eysenck, 1977; Rushton and Chrisjohn, 1981). There seems to be an underlying concept of 'behavioural restraint' involved (Gray, 1981, 1982); it will be of interest to see the degree to which the Eysenckian typology is subsumable by the r/K dimension.

Rule-following

One of the differences between r- and K-selected species pertains to the degree of social organization manifested. Among humans, social organization depends on following rules and, as we have seen, individual differences in intelligence and extraversion have been linked to individual differences in rule-following. That intelligence is now regarded as a central variable in the development of a scientific theory of delinquency is demonstrated by the finding that IQ has an effect on delinquency independent of family background, race or class: full siblings reared together in the same families show almost the same degree of association between IQ and delinquency as is found in the general population (Hirschi and Hindelang, 1977). Intelligence and extraversion have been linked to conscientiousness at work, as well as to more obvious criminal behaviour. Thus introverts are more punctual, absent less often and stay longer at a job, whereas extraverts spend more time talking to their workmates, drinking coffee and generally seeking diversion from routine (Wilson, 1981). Accident proneness in bus drivers has also been found to relate to intelligence and extraversion (Shaw and Sichel, 1970).

Altruism

Increasing research has been directed into individual differences in altruistic behaviour (Rushton, Chrisjohn and Fekken, 1981). One finding is that these are substantially inherited (Rushton,

Fulker, Neale, Nias and Eysenck, 1985). Moreover, they relate to a variety of other personality characteristics and measures of morality, including moral reasoning, moral knowledge, honesty, persistence, self-control, low aggression, strong feelings of personal efficacy and well-being, an internal locus of control and what might generally be called 'integrity' (Rushton, 1980). This description of the altruistic personality is remarkably similar to that which Berkowitz and Lutterman (1968) characterized, on the basis of a different literature, as 'the traditionally socially responsible personality'. It might well be the case that consistency in consideration for others may be one of the best indices of K.

GROUP DIFFERENCES IN K

Socio-economic status (SES) and ethnic group differences in genetically-influenced personality traits have often been observed (Rushton, 1984a, b). Differential K Theory may order these too. It is possible to tentatively rank, in terms of K: higher SES > lower SES; and Mongoloids > Caucasoids > Negroids.

SES differences in such K characteristics as family size, IQ and law-abidingness are well-documented (Hirschi and Hindelang, 1977; Jensen, 1980; Zajonc *et al.*, 1979). Less well-known are SES differences in dizygotic twinning rates and sexual behaviour. In regard to dizygotic twinning, a measure which, as mentioned, can be taken as an index of litter size, some evidence shows that DZ twins are more frequent in lower SES groups than in higher ones (MacGillivray, Nylander and Corney, 1975). With respect to sexual behaviours, Weinrich (1977) analysed over 20 studies from the world literature on this topic from an r/K perspective and concluded that the lower the SES, the earlier the age of first coitus, the greater the likelihood of pre-marital coitus and coitus with prostitutes, the shorter the time before engaging in extra-marital affairs and the less stable the marriage bond. Weinrich (1977) also scaled acts of sexuality in terms of how much they maintained the marriage bond over and above directly leading to conception. In this scaling, non-coital acts such as fellatio, cunnilingus, petting and affection, were seen as least directly reproductive, followed by coitus during menstruation and in the female-above position, followed by coitus in the familiar 'missionary' position. The higher the SES, the more likely the individual was to engage in activities beyond those of direct reproductive potential. That these patterns involve other traits, and are under genetic influence, is suggested by the finding that those who move into a social class different from their parents show the sexual behaviour of their acquired class *before* they actually make the change (Weinrich, 1977; Kinsey, Pomeroy and Martin, 1948).

In regard to the literature on race differences, international and historical comparisons have demonstrated group mean differences in activity level, behavioural restraint, developmental and sexual precocity, intelligence and law-abidingness such that Orientals are more in the K-direction than Europeans, who, in turn, are more K than Africans (Rushton, 1984a, b). This ordering accords well with data on dizygotic twinning where the rate per 1000 births among Orientals is 4; among Europeans, 8; and among Africans, 16 (Bulmer, 1970). Similarly, a comparison of the incidence of triplets and quadruplets show a higher frequency among Africans than Europeans (MacGillivray *et al.*, 1975). A parallel ranking in longevity has also been found (Bengston, Kasschau and Ragan, 1977). Consider briefly some of the ethnic group differences in more detail.

Activity level

Newborn Chinese-Americans, on average, are quieter and more readily soothed than Euro-Americans who, in turn, are less active than Afro-Americans (Freedman, 1979). One measure involves pressing the baby's nose with a cloth, forcing it to breathe with its mouth. Whereas the average Chinese baby appears to accept this, the average Euro- and Afro-American baby fights it immediately. Subsequent studies have replicated these findings in other countries with quite different measures and samples. The Navajo Indians of the southwestern U.S.A., for example, stoically spend much of their first 6 months of life wrapped to a cradleboard. Attempts to get Euro-Americans to accept the cradleboard have met with little success (Freedman, 1979). The Navajo are like the Chinese in being classified as belonging to the Mongoloid race.

Behavioural restraint

A large number of studies have tested the personality of the Chinese and Japanese both in their homelands and in North America (Vernon, 1982). On average, using questionnaire methods, Asians score more introverted and anxious and less dominant and aggressive than Europeans. These differences are manifest in play behaviour, with Asian children being quieter, more cautious and less competitive and aggressive than Euro-Americans. Eskimos, who are also Mongoloid, are likewise behaviourally restrained (LeVine, 1975). African-descended people, on the other hand, tend to the extraverted end of the continuum. Individual differences in anxiety, behavioural restraint and extraversion have been linked to the inhibitory system of the brain (Gray, 1982).

Developmental and sexual precocity

In the U.S.A., blacks have a shorter gestation period than whites. By week 39, 51% of black children have been born, while the figure for whites is 33%; by week 40, the figures are 70 and 55%, respectively (Niswander and Gordon, 1972). This precocity continues throughout life. In terms of physical coordination, Freedman (1979) found that, unlike Europeans and Asians, many African newborns can hold their heads erect. These results are unlikely to be due to cultural differences, for (a) the same ethnic group differences emerge when Afro-Americans are tested (Freedman, 1979) and (b) concomitant differences are found in skeletal maturity, as measured by growth of ossification centres throughout the first years of life (Eveleth and Tanner, 1976). Afro-American children also walk at an average age of 11 months, compared with 12 months in Euro-Americans and 13 months in American Indians (Freedman, 1979). Afro-Americans are also more precocious sexually, as indexed by age at menarche (Malina, 1979), first sexual experience (Weinrich, 1977) and first pregnancy (Malina, 1979).

Intelligence

On the average, the Chinese and Japanese in North America have reached higher educational and occupational levels than Euro-Americans, and score higher on tests of intelligence (Vernon, 1982). Other studies document the higher intelligence of the Japanese in Japan (Lynn, 1982; Misawa, Motegi, Fujita and Hattori, 1984; but see Flynn, 1984). African-descended people, however, score lower than Europeans on measures of intelligence. In the U.S.A., the difference between blacks and whites has remained at approx. 1 SD for the last 70 years (Loehlin, Lindzey and Spuhler, 1975), a difference that Jensen (1985) recently demonstrated to be chiefly one in psychometric *g*. African-descended people also score lower than Europeans elsewhere in the world, including Britain (Scarr, Caparulo, Ferdman, Tower and Caplan, 1983), and such post-colonial African countries as Nigeria, Tanzania and Uganda (Lynn, 1978). If the cultural attainments of Orientals, Europeans and Africans on their home continents are examined (e.g. by dating such inventions as written language, numbering systems, calendars, codified rules of law, astronomical systems, domestication of plants and animals and metal technology), the rank ordering remains the same (Baker, 1974).

Law-abidingness

Afro-Americans constitute 12% of the U.S. general population and 48% of the prison population (*Newsweek*, 15 March 1981). Similar figures are found in Britain: while comprising 13% of the population of London, African-descended people account for 50% of the crime (*Daily Telegraph*, 24 March 1983). These findings hold regardless of whether they are based on surveys of victims or on official police records. The Chinese and Japanese in North America, however, have a lower incidence of crime than do Europeans (Vernon, 1982). Asian immigrants to Britain are similarly 'underrepresented' in crime figures. Cross-cultural studies of developing countries suggest these findings may be generalizable (e.g. Clinard and Abbott, 1973).

DISCUSSION

Evidence was reviewed to the effect that a single dimension—*K*—underlies a variegated complex of characteristics pertaining to life histories, social behaviour and physiological functioning in

dandelions, fish, mice and men. For humans, K is proposed to order the diverse biosocial differences found between people. Thus traits such as intelligence, altruism, law-abidingness, activity level, extraversion and strength of sex drive are expected to covary with developmental precocity, family structure and reproductive strategy. A summary of the specific variables which the theory would predict to be correlated, along with those already documented to be in accord with the theory, those contradictory and those which have not yet been examined, is shown in Table 2.

Alternative theories are able to account for some portion of the observed constellation of correlations considered in Table 2. Purely cultural transmission theories predict that, due to uncertainty that offspring will survive to reproductive maturity, individuals from environments in which the control of resources is unpredictable are, in effect, socialized to opportunistically produce as many children as possible while devoting less parental care (Weinrich, 1977). Such theorists presumably argue that traits such as extraversion and an absence of rule-following are consequences of this socialization and/or are useful social attributes that enable the pursuit of this strategy. More genetically-based theories are possible. One is that intelligence accounts for the findings. Thus less intelligent people simply fail to learn behavioural restraint, marriage-bonding techniques, moral rules or how to raise children adequately. Moreover, their low intelligence makes them less capable of predicting their environment or, indeed, of creating stable personal circumstances. Such an argument would be strengthened if added to the Eysenckian (1981) scheme and/or the reformulations of it (Gray, 1981). Research has been reviewed above on the heritability of extraversion and its relation to many of the variables discussed, including IQ, law-abidingness, sexuality and other reproductive behaviour patterns.

The theories mentioned above go some way to ordering the extant literature. However, they are all *post-hoc* explanations, quite unlike the *a priori* predictions derivable from Differential K Theory. Moreover, they do not address the non-human literature, nor do they order the physical variables such as twinning rates and developmental precocity. Thus no other single theory appears to fit parsimoniously such an extensive array of facts as Differential K Theory. This is not to deny the anomalies that exist. For example, the theory should predict that the higher SES the person, the later he or she would enter puberty and yet, at least within European groups, the opposite appears to be true (Malina, 1979). Other contradictory findings occur with body build: since large body size is supposedly a sign of K (but see Strathmann and Strathmann, 1982), the expectation should be that Orientals would be larger than Europeans who, in turn, would be larger than Africans, and yet the opposite appears to be true. Similarly large body size should dispose to law-abidingness and yet, the evidence is in the opposite direction (Eysenck, 1977). The striking thing about Table 2, however, is the infrequency of such lapses.

The K dimension is not limited to those areas reviewed; the theory is ultimately expected to systematize a much wider variety of personality and life history information. Novel tests of the theory are possible. Since the tendency to have dizygotic twins is partly inherited and related to having larger numbers of other children (Bulmer, 1970), it has been used here as an index of r-strategy. It should be possible, therefore, to contrast the personalities and life histories of such twins with those of monozygotes who will reflect a K-strategy control. Unfortunately it is known that DZ twins (and DZ males, especially) are underrepresented in most twin studies, making suitable comparisons problematic (Lykken, Tellegan and DuRubeis, 1978). If volunteering for research can be considered a measure of altruism, however, support for Differential K Theory is already at hand. Alternative tests of Differential K Theory are derivable from questionnaire studies including those from twin samples: for example, is the tendency to space births far apart a heritable characteristic and does it relate to other characteristics of the respondent?

If the framework advocated here is correct, than many open-ended but interesting empirical questions can be raised. Since efficient energy use is a K-strategy (see Table 1), does metabolic rate covary with body build and personality? Given that colonization is an r-strategy (see Table 1), are people who frequently move habitat less K than those who do not? Given that degree of social organization varies with K (see Table 1), are people who prefer less-structured interpersonal social systems lower in K than those who tend to organize themselves into more formal ones, and is this tendency related to a need for 'personal space'? Assuming similar genotypes detect and seek each other out for friendship and marriage (see Rushton, Russell and Wells, 1984), will there be high

Table 2. Correlations among variables relevant to Differential K Theory

	Heritability	SES	Race	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
1. Dizygotic twinning	+			1.0																			
2. Birth spacing		+			+																		
3. Family size	+				+	1.0																	
4. Marital stability		+					1.0																
5. Parental care		+						1.0															
6. Infant mortality		+							1.0														
7. Gestation period		+								1.0													
8. Birthweight		+									1.0												
9. Age of puberty		+										1.0											
10. Age of first coitus		+											1.0										
11. Age of first reproduction		+												1.0									
12. Body size (height)		+													1.0								
13. Longevity		+														1.0							
14. Intelligence		+															1.0						
15. Altruism		+																1.0					
16. Law-abidingness		+																	1.0				
17. Activity level		+																		1.0			
18. Sex drive		+																				1.0	
19. Extraversion		+																					1.0

Positive signs document correlations in accord with the theory, negative signs document those contradictory and blanks represent those not yet examined.

social assortment on the K dimension? And, if people create cultures compatible with their genotypes (see Lumsden and Wilson, 1981), are all these tendencies not only related to each other but also to socio-political attitudes (e.g. order vs freedom; conservatism vs liberalism), and ultimately to demographic trends and the very sweep of history? Irrespective of these final conjectures, the study of the relationships among the dimensions discussed throughout this paper could, I believe, lead to a greater synthesis of the field of personality and individual differences.

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