

Life History Theory and Human Reproductive Behavior: Environmental/Contextual Influences and
Heritable Variation

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Abstract

The purpose of this paper is to develop a model of life history theory that incorporates environmental influences, contextual influences, and heritable variation. I argue that physically or psychologically stressful environments, delay maturation and the onset of reproductive competence. The social context is also important, and here I concentrate on the opportunity for upward social mobility as a contextual influence that results in delaying reproduction and lowering fertility in the interest of increasing investment in children. I also review evidence that variation in life history strategies is also influenced by genetic variation. Finally, I show that cultural shifts in the social control of sexual behavior have had differential effects on individuals predisposed to high-investment versus low-investment reproductive strategies.

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The purpose of this paper is to develop a model of life history theory that incorporates environmental influences, contextual influences, and heritable variation. I will argue that deleterious environments (e.g., physically or psychologically stressful environments) delay maturation and the onset of reproductive competence. The social context is also important, and here I concentrate on the opportunity for upward social mobility as a contextual influence that results delaying reproduction and adopting a low-fertility, high-investment life history strategy. Nevertheless, although environmental and contextual influences are important, I show that that variation in life history strategies is also influenced by genetic variation. Finally, I will discuss the differential effects of social controls on sexual behavior on high-investment versus low-investment reproductive strategies.

LIFE HISTORY THEORY AND THE COHERENCE OF DEVELOPMENT

Life history theory attempts to understand variation in the reproductive strategies adopted by different life forms. Life history theory implies a considerable coherence to individual development because a reproductive strategy involves a coordinated response to the organism's environment resulting from the need to optimally partition mating and parenting effort. The fundamental dimension of reproductive strategies may be construed as a dimension that ranges from a high-parental-investment/low-mating-effort strategy to a low-parental-investment/high-mating-effort strategy (e.g., Wilson, 1975).

A particular life history strategy of parenting results in a coordinated suite of traits at all stages of the lifespan. This is because a reproductive strategy involves a response to a central external ecological contingency that selects for optimum levels of partitioning mating effort and parenting effort. The result is that variables such as mortality rates, longevity, pair bonding, age of first reproduction, period of pre-adult dependency, and levels of paternal and maternal investment evolve as a coordinated response to the environment. Thus, for example, species adapted to environments where there is a relatively stable, predictable resource base tend to have a suite of traits allowing them to produce highly competitive offspring. Such species would be

likely to have traits such as pair bonding between parents, high-investment parenting (including paternal provisioning of the young), low fertility, and delayed maturation of the young.

Data Showing the Coherence of Development. A life history perspective implies that there will be considerable coherence to development because of the unifying force of parental investment as a critical focus of natural selection. This in turn implies that there will be a great deal of overlap among the variables central to parental investment. For example, increasing brain size is associated with increasing intelligence and increasing levels of parental care across a wide range of species (Lovejoy, 1981; Rushton, 1995; Schultz, 1960). The expectation is that among humans variation in parental investment will co-occur with variation in intelligence as well as with mechanisms such as parental warmth that play a critical motivational role in high-investment parent-child relationships.

Moreover, there is the general expectation that the high-investment end of the parental investment continuum will be characterized by greater developmental plasticity, at least during the period of pre-adult dependence on parents. This follows because developmental plasticity is a necessary condition for the effectiveness of important aspects of the environments provided by parents. Plasticity is a two-edged sword because it opens up the organism to environmental influences that may be detrimental to individual development (Lerner, 1984; MacDonald, 1985). As a result, one expects to find associations among brain size, mental ability, learning ability, flexibility of response, and developmental plasticity. And one expects to find associations among these variables and the elaboration of costly parenting practices, delayed sexual maturation, and a prolonged juvenile period in which social learning is of great importance. This is indeed the general evolutionary thrust among the mammals, and in particular, among humans (Bonner, 1980; Eisenberg, 1981; Gould, 1977; Jerison, 1973; Johanson & Edey, 1981; Lerner, 1984; Lovejoy, 1981).

Support for these associations is also indicated by findings showing higher levels of parent-child play and generally better developmental outcomes in parent-rearing societies compared to sibling-rearing societies (MacDonald, 1993). Play, parental investment, and plasticity are intimately connected to each other. If there were no plasticity, there would be no reason to engage in play. The decline in play during adulthood is an important prediction of this

perspective. Similarly, if there were no plasticity, other aspects of parental involvement, such as the high levels of verbal communication apparent in high-investment parent-child relationships (see below), would be ineffective and therefore result in costs to parents with no corresponding benefits to children.

These associations imply that greater mental ability is a critical co-evolutionary concomitant of plasticity (including social learning as an effectively domain-general psychological mechanism) because it minimizes the risk of maladaptive environmental influences while allowing beneficial effects (MacDonald, 1991). Parents with greater mental ability are better able to respond flexibly to adaptive demands. They are more likely to model behavior that is an adaptive response to non-recurrent, non-EEA environments than are individuals with less mental ability. And, at least partly because of the warmth of their relationship with their children, their children are more motivated to attend to them as models and more likely to conform to parental values.

The data reviewed by Belsky, Steinberg and Draper (1991) are highly compatible with this perspective. They especially note the large intercorrelations among spousal harmony, parent-child relationship quality, children's interpersonal style, timing of puberty, sexual behavior, and level of parental investment. As indicated above, behaviors related to parental investment and reproduction are central to life history theory.

The coherence of individual development also appears to involve measures of intelligence. IQ is the single most powerful measure of individual differences psychologists have developed and is related to variation in a very wide range of human activities. While IQ tests are mainly used as a measure of individual differences, it is also relevant to note that, compared to, say, chimpanzees, even humans with a low IQ are able to solve a very wide array of problems that were not recurrent problems in the human EEA. The average human level of *g* therefore may be conceptualized as resulting from a set of species-typical, domain-general mechanism(s) underlying the specifically human advantage in mental ability compared to other species.

Like social learning, human intelligence may be viewed as set of domain-general systems that function to achieve evolutionary goals. For example, research on IQ indicates correlations with socio-economic status (e.g., Scarr & Weinberg, 1978). If social status is indeed an evolved

human motive disposition as proposed by several theorists (e.g., Barkow, 1989; Betzig, 1986, Buss, 1994; Turke, 1989), the implication is that individuals higher on *g* are better able to use their domain-general cognitive abilities to achieve an evolved motive disposition (social status) in an environment far removed from the human EEA. For example, individuals with high *g* in the contemporary world would score well on standardized tests used to select applicants to prestigious graduate schools. They would be able to solve a very wide array of problems presented in the curriculum of these schools and would excel their colleagues after graduation, with the result that they would achieve higher social status, make more money, and be a more desirable mate (i.e., achieve proximate evolutionary goals). Their higher intelligence implies that their mental ability is not narrowly restricted to the ability to solve highly discrete problems presented by recurrent situations in the human EEA. Rather, their high level of general intelligence would allow them to master the intricacies of a wide range of fields requiring a high level of general intelligence. An individual with a high *g* would, all things being equal, be more likely to succeed not only, say, in the legal profession but also in medicine, business, academia, or government.

Within this perspective, natural selection for intelligence as a domain-general attribute would be favored because it enabled humans to attain evolutionary goals. Moreover, variation in IQ is linked to the different patterns of development reviewed by Belsky et al (1991) (see reviews in Herrnstein & Murray [1994]; Rushton [1988, 1995]; Wilson & Herrnstein, 1985; see also below). Besides predicting outcomes directly related to mental testing, such as school performance, these results indicate associations among IQ, proneness to illegitimacy, child abuse, low birth weight, sexual behavior, divorce (unstable pair bonding), rates of physical maturation, parent-child relationships, poverty, welfare dependency, and crime.

The data may therefore be interpreted as indicating that there is a very important central core of co-varying systems (many of them presumably domain-specific; see below) that includes at least one highly domain-general ability—the *g* factor of IQ tests. While the associations among the various systems are not robust enough to preclude a semi-independent role for discrete evolved systems such as the human affectional system and other personality systems, the substantial coherence of individual development strongly suggests the importance of life-history

theory in conceptualizing human development. As indicated above, life history approaches to human development focus fundamentally on variation in reproductive strategies (e.g., Belsky et al 1991; Chisholm, 1993; MacDonald, 1994; Miller, 1994a; Rushton, 1988, 1995), and within such perspectives parental investment is the critical variable.

Environmental and Genetic Aspects of Parental Investment. Within this perspective, a critical aspect of high levels of parental investment is the provision of optimal environments for children. If we accept the proposition that there was natural selection for high-investment parenting among humans (e.g., Fisher, 1992; Flinn & Low, 1986; Lancaster & Lancaster, 1987; Lovejoy, 1981; MacDonald 1988), then it is reasonable to suppose that one result of this process is that high-investment parents provide certain types of high-quality environments for their children and that these environments contribute to the child's development. Parental investment clearly involves the provision of certain environments, and parents incur a considerable cost in providing these environments: Parental investment includes developing a strong affective relationship with the child, providing relatively high levels of verbal stimulation and parent-child play, and active parental involvement in monitoring virtually every aspect of the child's life (e.g., children's progress in school, children's peer relationships) (Belsky et al, 1991; MacDonald 1988, 1992, 1993). From a theoretical perspective the best evidence that the environments provided by high-investment parents must have benefits is that they are costly to provide. Theoretically it is difficult to conceive of a behavior with clear costs remaining in a population without some compensating benefits. For example, if children do not benefit from paternal investment, it is difficult to conceptualize why either males or females would seek such investment. Under these circumstances, males would be better off competing with other males for access to additional females (i.e., increasing their mating effort) than to invest in the offspring of one female (i.e., maintaining high levels of parenting effort). Indeed, minimal parenting effort by males is a common pattern in nature, especially among mammals (e.g., Kleiman, 1977, 1981).

While the foregoing argues for the importance of children's environments, it is not inconsistent with evidence that high-investment parenting is itself genetically influenced. There is evidence for reasonably high heritability of all of the behaviors related to parental investment. Thus measures of parents' and children's perceptions of parental control and especially parental

warmth are genetically influenced (Rowe, 1994). Parental stimulation and involvement (including measures of parental warmth and control) as measured by the Home Observation for Measurement of the Environment (HOME) and the Family Environment Scale (FES) also have a considerable genetic component (Plomin, 1994). These measures of parental investment co-vary to a considerable degree with high IQ which is itself substantially heritable (Plomin 1994; see also below). Interestingly, research with the HOME also supports the coherence of development: There is substantial co-variation among the HOME subscales of emotional and verbal responsivity, provision of play materials, maternal involvement, and opportunities for variety of stimulation (Bradley & Caldwell, 1984). Parents who provide verbal stimulation and monitor their children closely also tend to have close emotional relationships with them.

The behavioral genetic evidence may be interpreted as indicating that parents and their children are a co-evolving system in which passive genotype-environment correlations are of great importance. (Passive genotype-environment correlations are correlations between children's genotypes and the environments provided to children. For example, there may be correlations between children's genotypes and the environments provided by their biological parents. Intelligent parents have children with a high genetic potential for intelligence and they also provide optimal environments for the facilitation of their children's intelligence.) Children would be expected to differentially benefit from the environments provided by high-investment parents depending on their genotype. Thus far the evidence does indeed indicate that, in early childhood at least, passive genotype-environment correlations are more important contributors to the correlations between measures of IQ and the HOME and FES measures of the environment than are active or evocative genotype-environment correlations (Plomin, 1994). (Active genotype-environment correlations occur because the child seeks out environmental niches consistent with his/her genotype; evocative genotype-environment correlations occur because children's genotypes influence the way others respond to them.) The evidence does not show that the environments parents provide are of no importance.

LIFE HISTORY THEORY: THE ROLE OF ENVIRONMENTAL AND CONTEXTUAL INFLUENCES

The data reviewed above indicate a substantial coherence to individual development. In the following I will describe three types of variables useful in conceptualizing variation in parental investment in historical and contemporary human societies: environmental influences reflecting stressful environments and scarce resources; the perceived likelihood that high-investment parenting will lead to upward social mobility of children; and heritable variation.

Conceptualizing Human Reproductive Strategies: Adversity Selection and the r/K Continuum of Reproductive Strategies. Theoretically, high-investment parenting is associated with adaptation to ecologically adverse or highly competitive environments where high levels of parental investment are critical to rearing successful offspring (Diamond, 1986; Kleiman, 1977, 1981; Miller, 1994b; Wilson, 1975; Southwood, 1981). This makes intuitive sense because in ecologically adverse or highly competitive situations, male provisioning of food or other resources might tip the balance in favor of offspring compared to the offspring of males who do not provision their young. Indeed, several theorists have proposed that the adverse environment created by the Ice Age had an important role in shaping the intelligence and high-investment reproductive behavior of northern populations (Lenz, 1931; Lynn, 1987; MacDonald, 1994; Miller, 1994a,b; Rushton, 1988, 1995). Within this framework, natural selection resulted in a uniform tendency toward high-investment parenting as a result of long-term resource scarcity: Males who did not provision their young left few descendants. Long term selection in resource-scarce environments is therefore expected to lead to high investment parenting, not low-investment parenting.

In addition to ecologically adverse environments, highly competitive environments may also lead to high-investment parenting. Here the theoretical focus has been on the r/K continuum of reproductive strategies. r-selected species evolve in response to highly unstable environments where there is little predictability of resource availability. These species adopt a low-investment/high-fertility reproductive strategy to take advantage of temporary situations where there are abundant resources and little competition. The low investment of relatively r-selected

species is not a response to a temporary lack of resources, but rather a response to a highly unpredictable resource environment in which there is selection for very rapid reproduction with little parental effort during the relatively short-lived periods of resource abundance.

On the other hand, K-selected species evolve in response to a highly stable, predictable resource environment. These species adopt a high-investment/low fertility strategy in order to compete with conspecifics and with other species (Southwood, 1981). While r-selected species respond to temporary periods of resource abundance with a low-investment reproductive style, K-selected species adapt to a highly predictable resource environment in which parents are forced to forego additional matings in order to invest their time and energy in producing highly competitive offspring.

Within the r/K framework, then, low investment parenting is not a response to resource scarcity, but rather a response to unpredictable short-term resource abundance. Moreover, while r-selected species tend to overshoot their resource base, adversity-selected and K-selected species remain within the carrying capacity of the environment. The expected response, therefore, of a K-selected or adversity-selected species to resource scarcity would be to delay reproduction until reproduction was viable, but not to respond to adversity with low-investment reproduction (see also Miller, 1994b). The expectation would be that cues to environmental adversity would result in a delay of maturation and reproductive viability, rather than an acceleration as predicted by the theory of Belsky et al.

To summarize this section, both competition and environmental adversity tend to result in animals having fewer and more widely spaced offspring, prolonged parental care, longer life span, and lower mortality rates at all stages of the life span. Conversely low-investment parenting is associated with environments rich in resources and with little competition. In the natural world, resource-rich, competition-free environments are typically ephemeral because a stable resource-rich environment will ultimately lead to intense competition and K-selection.

The Role of Environmental Stresses in Eliciting Alternate Human Reproductive Strategies. Belsky et al (1991; see also Chisholm, 1993) argue that the differing patterns of coherent development result from a universal psychological mechanism that results in different reproductive strategies as a response to the presence or absence of environmental stress and high

or low resource availability. They propose an “alternate strategy” perspective in which a low-investment reproductive strategy results as an adaptive response to environmental stress. Low resource availability leads to spousal disharmony and insensitive, unresponsive parenting styles. This in turn leads to insecure attachment and an opportunistic interpersonal style among children. Children adopting this strategy enter puberty at an earlier age and they are sexually precocious compared to children in a resource abundant environment. As adults, they are prone to unstable pair bonds.

While Belsky et al (1991) argue for this alternate strategy perspective, they also note that additive genetic variation (i.e., heritability) may influence these patterns. Indeed, Moffitt, Caspi, Belsky, & Silva (1992), while replicating the findings of an association between childhood stress and pubertal timing, suggest that a genetic model provides a more parsimonious fit for the data. Supporting a genetic interpretation, pubertal timing was associated with mother’s age of menarche and there was no support for the idea that early puberty was mediated by childhood behavior problems.

On the other hand, Graber, Brooks-Gunn and Warren (1995) found that the quality of family relationships added to the variance explained by mother’s age of menarche and an index of breast development. As also found by Surbey (1990), there was a significant but negligible negative correlation between stressful events and onset of menarche. However, these studies cannot test between a heritability model and an alternate strategy model of pubertal timing: Mother’s age of menarche is a fairly crude index of genetic influences on daughter’s age of menarche, and familial relationship quality and the occurrence of stressful life events may be influenced by genetic factors.

As indicated above, there is indeed evidence that variables related to reproductive strategies are heritable. In addition, pubertal timing is also substantially heritable (Fischbein, 1977; Tanner, 1990), and there are moderate heritabilities for age of first sexual intercourse (Martin, Eaves, & Eysenck, 1977), warmth/nurturance and impulsivity/extraversion as personality traits (i.e., Factors I and II of the FFM) (e.g., Digman, 1990), parental warmth toward children (Rowe, 1994), parenting styles (Plomin, McClearn, Pedersen, Nesselrode, &

Bergeman, 1989), and likelihood of divorce (Rowe, 1994). Also, the reproductive strategy perspective developed here includes intelligence as a critical, highly heritable variable.

In the following I will argue that the available evidence is most compatible with supposing that selection for competitive ability (K-selection) and/or an adversity-selected pattern of parental investment is a universal feature of human evolution. Within this perspective, individual differences in parental investment patterns are influenced by heritable variation remaining in the population because natural selection did not remove all of the genetic variation related to parental investment. This perspective implies that genetic variation continues to underlie a range of more or less viable strategies within contemporary populations, as is also the case with personality variation and intelligence (MacDonald, 1991, 1995b). (There may also, of course, be continuing natural selection in favor of high- or low-investment parenting in present-day societies.) And, in addition to within-group genetic variation, there may also be between-group differences resulting from different selection pressures affecting groups that evolved in somewhat different ancestral environments (e.g., northern versus equatorial populations).

Nevertheless, environmental/contextual influences are important and may be understood as eliciting alternate strategies of reproductive behavior depending on environmental cues. For example, the presence of nursing offspring and a low net energy flow to females inhibit reproduction among humans and other mammals (Kaplan 1996). In addition, a number of social influences on reproductive strategies have been identified among animals. The presence of socially dominant animals suppresses the development of sexual competence in several species, while and in some species the presence of related males results in delaying female sexual maturation (prairie dogs, voles) or advancing (bushbabies, tamarins) female sexual maturation (see Surbey, 1990; Worthman 1990).

In the following I review evidence that historically important examples of environmental stressors related specifically to resource scarcity result in delaying development. In addition, perceptions related to social mobility will be advanced as a separate type of environmental cue eliciting alternate reproductive strategies.

There is a very consistent pattern indicating that stressors of all kinds uniformly result in a lowered tempo of maturation, including age of menarche, but this pattern is superimposed on a pattern of heritable variation for all measures related to physical growth and development (Tanner, 1990). Some of the more interesting data gathered by Tanner (unless otherwise referenced) include the following:

- Malnutrition (e.g., in times of war) or disease slows down physical maturation. Psychosocial stressors (e.g., abusive family relationships, sadistic teachers) have similar effects on physical maturation as do nutritional deficits or deficits due to disease, i.e., a slowing of developmental tempo. Consistent with these findings, Flinn and colleagues (Flinn & England, 1995; Flinn et al, 1996) show that stressful life events, including family quarreling, living with non-relatives, residence change, divorce, and death of a family member, are associated with infectious diseases and other health problems, as well as inhibited growth, and delayed sexual maturity.
- When controlled for environmental variables, rates of physical maturation reflect ancestral environments rather than current environments (see also Rushton, 1995). This finding emphasizes the importance of heritable variation in physical maturation.
- In Britain, upper SES children continue to mature more rapidly than lower SES children. Additional children of manual workers show more of a growth decrement in comparison to their older siblings than do additional children of non-manual workers. These findings are compatible with the proposal that the greater nutritional and psychological stresses occurring in the lower classes delay maturation.
- Social class differences in growth rates have been obliterated in Sweden and Norway, a result that Tanner suggests is due to the success of social welfare programs in those countries.
- There is a pronounced secular trend (beginning at least 150 years ago in England) of lowered age of menarche associated with better nutrition co-incident with modernization. It is unlikely that these changes are the result of increasing stress in the modern world, since this rise is associated with increases in the birth weights of babies (e.g., Gruenwald et al, 1967), increases in brain size (e.g., Miller & Corsellis, 1977), and increases in height (Tanner, 1990). More likely, the changes are the result of better nutrition consequent to higher living

standards. Real standards of living have approximately doubled between the 1930's and the 1980's (Coleman & Salt, 1992). Indeed, Flinn and England (1995) summarize data indicating that chronic stress is associated with immune deficiency, inhibited growth, and delayed sexual maturity. These findings are consistent with the general tendency for the stress response to suppress gonadal androgens, although the relationship between stress and the regulation of sex hormones remain poorly understood (Graber et al, 1995).

- The stress of high levels of physical exercise, as among dancers and athletes, is known to delay the onset of puberty (Calabrese, Kirkendall, Floyd, Rapoport, Williams, Weiker, & Bergfeld, 1983; Warren, Brooks-Gunn, Fox, Lancelot, Newman, & Hamilton, 1991; Warren, Brooks-Gunn, Hamilton, Hamilton, & Warren, 1986).
- The confluence model indicates that intelligence declines as a function of birth order and less spacing between births (Zajonc, Markus, & Markus, 1979).

These findings suggest that psychosocial and physical stressors work by uniformly delaying physical growth and development—as expected on the hypothesis that humans are a relatively K-selected and/or adversity-selected species. Moreover, affluence and lack of stress are associated with acceleration of development. Such findings are incompatible with the idea that the effects of stress operate as an inverted ‘U’ function in which both high levels of stress and developmentally “ideal” environments result in delayed development, while moderate stress accelerates development (see Belsky et al, 1991).

The Effects of Environmental Adversity and Perceptions of Upward Social Mobility on Life History Strategies. There is evidence that environmental adversity tends to result in delaying marriage and reproduction. Western populations have typically responded to environmental adversity by delaying reproduction and/or continuing a high-investment style of reproduction. The Great Depression and the depression of the 1890's were associated with later marriage, delays in having children, and markedly lower levels of fertility. On the other hand, the prosperity during and after World War II resulted in a decline in age of marriage and earlier child bearing (Coleman, 1990; Moss, 1964). This pattern is typical of Western societies over historical time (Hajnal 1965; 1983; Laslett 1983; MacFarlane 1980, 1986; Wall 1983; Wrigley and Schofield, 1981). The prime mechanism for the regulation of population in pre-industrial

Western Europe centered around a flexible age of marriage, pre-conjugal chastity, and varying the percentage of females marrying. In times of resource scarcity, the age at marriage for both sexes, but especially for males, increased, while in economically expansive times, the age of marriage was lowered. For example, Wrigley and Schofield (1983) find that at the end of the 17th century approximately 23% of individuals of both sexes remained unmarried between ages 40-44, but that, as a result of altered economic opportunities, this percentage dropped at the beginning of the 18th century to 9%, and there was a corresponding decline in age of marriage. The illegitimacy rate throughout the pre-modern period was usually far less than 3% until after 1750 (Laslett, 1977) and there was no tendency for the rate to increase during times of resource scarcity.

Elder's (1974) data on children experiencing the Great Depression during adolescence are particularly interesting. Consonant with the general tenor of the theory of Belsky et al (see also Conger, Conger, Elder, Lorenz, Simons, & Whitbeck, 1992), economic hardship and status loss during the Depression resulted in strained interpersonal relationships and emotional distance of adolescents from their parents. The deprived group from middle-class backgrounds tended to marry earlier (i.e., before age 20) than the non-deprived group. (There was no effect of deprivation on age of marriage among the working class women. These women tended to marry relatively early in any case.) Deprived women from middle-class backgrounds who married relatively young tended to have emotionally distant relationships with parents (especially the father), and they were characterized by earlier dating and heterosexual experience.

Nevertheless, women with deprived backgrounds had no more children and actually gave birth to their first child 8 months *later* on average than non-deprived women. Their marriages were no less stable than those of the non-deprived group and their husbands had higher levels of education, income, and social status than those of the non-deprived women. Both women and men from deprived backgrounds were more highly committed to family life and parenthood and to secure interpersonal relationships than non-deprived subjects.

It would appear then that the relatively precocious dating and sexual activity found among the deprived women were not in the service of low-investment reproductive relationships, but rather in the service of attaining economic stability and a high-investment reproductive style

characterized by high levels of commitment to family and to rearing children. Indeed, the general picture one gets is that economic insecurity and status loss resulted in a highly conservative strategy for both sexes combined with an intense desire for upward social mobility: “*Signs of family change among the offspring of deprived families are consistently in a conservative direction, toward traditional values and relationships*” (Elder, 1974; p. 286; italics in text). In addition to the data indicating a strong orientation toward family concerns, parental responsibility, and domesticity, deprived males valued economic security and were highly risk-averse in their economic decisions.

Deprived individuals were more likely to be upwardly mobile in later life than were non-deprived individuals. Interestingly, there was a stronger relationship between the physical attractiveness of the woman and status of husband among the deprived women, suggesting that these women were particularly interested in upward social mobility and were better able to capitalize on their reproductive assets to do so. In addition, boys from families who lost most from the depression scored higher on desiring status and power in social relationships, and in later life boys from deprived, formerly middle-class families achieved somewhat higher social status than the middle-class non-deprived group.

The suggestion is that the effect of economic deprivation on children was to intensify the motivation for upward social mobility and responsible, high-investment parenting. These general findings and the fact that these results were strongest in those with a middle-class background are highly compatible with the present perspective. If one supposes that, compared to the lower-class group, the formerly middle-class group was more prone to developing a high-investment style of parenting for genetic reasons, then their response to economic adversity is understandable: When confronted with economic hardship and status loss they did not switch to a low-investment reproductive strategy, but increased their striving for upward social mobility and increased their involvement in family and children.

Elder’s data therefore do not support the proposal that poverty or downward social mobility causes low-investment parenting, and especially so in formerly middle-class samples. In addition, the Depression resulted in markedly lower fertility and a dramatically lower rate of marriage in general (*Statistical Abstract of the United States [SAUS]*, 1992; Table 127). This

finding is consistent with the historic patterns of marriage in Western societies mentioned above: Economic hardship results in postponing marriage rather than adopting a low-investment reproductive style. It is also noteworthy that this trend toward delaying marriage was not accompanied by a rise in the rate of illegitimacy (a marker of low-investment parenting) (Herrnstein & Murray, 1994; p. 178). Rather, the revolution in illegitimacy began in the 1960's, at a time when levels of poverty were at an historic low (Ross, Danziger, & Smolensky, 1987).

Similarly, the rate of divorce actually decreased in the early 1930's and only began its long-term steep rise in the affluent 1960's (*SAUS*, 1992, Table 127). Divorce may be viewed as an index of unstable pair bonding which is often associated with single-parenting and higher levels of poverty among children. (There was also a temporary peak in divorce rate in the period immediately after World War II, during a period of relative prosperity compared to the years of the Great Depression. However, this temporary rise presumably resulted from ill-advised marriages occurring under wartime conditions.)

One might argue that it is not poverty experienced during adolescence that causes low-investment parenting, but rather poverty occurring during the period when affectional relationships are established within the family. Children, such as Elder's subjects, who were exposed to poverty during adolescence may have established close personal relationships (secure attachments) during early childhood. These secure attachments then predisposed them to pair bonding and high-investment parenting as adults. As a result, these individuals readily adopted a high-investment style of parenting when they achieved reproductive maturity.

The problem with such a perspective is that it would predict that children born during the late 1920's and early 1930's would be prone to low-investment parenting because they had been reared during an era of economic dislocation which resulted in distant, acrimonious parent-child relationships during early childhood. However, as indicated above, the revolutionary increases in the trends toward illegitimacy and divorce began only in the mid-1960's when childbearing in this cohort was largely finished. The revolution in illegitimacy occurred primarily to cohorts born after 1950, during a period of economic prosperity which lasted (as indexed by lowering rates of poverty) until 1970.

Finally, the argument that poverty causes illegitimacy fails to consider the very powerful status of IQ as a predictor of illegitimacy for women living below the poverty level (Herrnstein & Murray, 1994; p. 188). Rather than finding that low-investment parenting is a uniform response to poverty, low-investment parenting therefore appears to be strongly influenced by the highly heritable trait of intelligence which, as we have seen, is the centerpiece of a high-investment parenting strategy. IQ also predicts scores on the HOME instrument independent of SES, and IQ predicts poverty and welfare dependency independent of parental SES. Again, the suggestion is that variation in parental investment co-occurs with relative resource scarcity, but there is no reason to suppose that the latter causes the former.

In summary, perceptions of economic scarcity appear to result in delays in having children, markedly lower levels of fertility, and often delays in marriage. This phenomenon is a general one: Abernethy (1993), reviewing worldwide data, shows that in general economic prosperity leads to increased fertility, and economic downturns lead to declines in fertility.

Nevertheless, economic scarcity *per se* may not be the controlling variable. In the foregoing mention has been made of social mobility as a variable influencing reproductive decisions: Downwardly mobile people caught up in the Great Depression responded by delaying reproduction. This leads to the proposal that factors influencing perceptions of the link between reproduction and social mobility act as contextual cues for eliciting alternate reproductive strategies. The data presented in the following suggest that it is not resource scarcity *per se* that is the controlling contextual variable, but rather perceptions of how resource scarcity is linked to social mobility.

Evolutionary perspectives on the demographic transition have emphasized the importance of fertility control and high-investment parenting in achieving upward social mobility in response to the altered conditions following economic modernization. Thus Turke (1989; see also Kaplan, 1996) argues that the breakdown of extended kinship networks in conjunction with economic modernization resulted in young adults adopting a high investment/low fertility strategy. The breakdown of extended kinship networks resulted in the costs of children being borne entirely by parents, and economic modernization resulted in a highly complex human niche space in which attempts to improve or maintain social status for parents and children

required lower fertility. Children's dependence on parents was prolonged and there was a general trend to increase investment in children's education which in turn facilitated children's upward social mobility.

These results are broadly consistent with the previous section. Children are universally viewed as costly but desirable items. Indeed, prior to the demographic transition, the predominant pattern was that married couples practiced "natural fertility"; i.e., fertility unconstrained by any methods, such as birth control methods, designed to limit it (Lynn 1996, p. 25). Although there were powerful social controls preventing marriage of those unable to support families, poverty *per se* did not result in attempts to limit fertility within marriage. (Nevertheless, it is likely that low net energy flow to females would have resulted in lower levels of fertility [Kaplan, 1996]). What had changed was that the universal evolved motive of seeking social status increased the cost of children and large numbers of children compromised not only the future social status of the children by limiting their education, but the present social status of parents as well.

The critical role of the possibility for upward social mobility can be seen in the behavior of historic Jewish populations. First, there is good reason to consider Ashkenazi Jews as highly prone to developing a high-investment reproductive strategy (MacDonald, 1994). Ashkenazi Jews as a group have a very high average IQ. The average full scale IQ is approximately 117, with large differences between performance and verbal IQ compatible with an average verbal IQ of 125 and a performance IQ in the average range. There is good historical evidence for eugenic pressures as a result of marriage practices which produced a large overlap among intelligence, resource acquisition and reproductive success in traditional Ashkenazi Jewish society.

However, in addition to this greater genetic potential for intelligence, Jewish parents in traditional as well as contemporary societies provide very high levels of verbal stimulation to their children—clearly a marker of high-investment parenting. There is a preoccupation with elaborate verbalization, much of it directed at children (Blau, 1969; Herz & Rosen, 1982; Zborowski & Herzog, 1952). Further, there is a very strong emphasis on developing an intensely affectionate mother-child relationship in early childhood. Mothers have an "unremitting solicitude" (Zborowski & Herzog, 1952; p. 193; see also Blau, 1969) regarding their children.

They engage in “boundless suffering and sacrifice. Parents ‘kill themselves’ for the sake of their children” (p. 294). The children were “reminded constantly of all their parents have done and suffered in their behalf.”

The result is an elaboration of internalized motivational systems—another marker of high-investment parenting. In particular, there is an intense motivation to please parents. “All the sacrifice, all the suffering, all the solicitude pile up into a monument to parental love, the dimensions of which define the vastness of filial indebtedness” (Zborowski & Herzog, 1952; p. 297). Children are treated with a great deal of indulgence and permissiveness and there are elaborate methods of inductive reasoning used in an effort to modify children’s behavior (Blau, 1969). There is also very powerful internalized motivation to conform to extremely high parental expectations. Jewish children are expected to provide their parents with *naches* (i.e., desired rewards) in the form of achievement, financial success, and grandchildren, and the failure to provide them causes guilt. “Of course, there can never be enough *naches*, and their failure to provide ‘enough’ inevitably results in guilt” (Herz & Rosen 1982, 380). Blau (1969; p. 60, 61) mentions “the profound fear of the guilt that denial of [the mother] would engender. . . . It was the discomfort—*anxiety and guilt*—that parental disapproval induced rather than fear of coercion that led Jewish children at a relatively tender age to internalize those norms of behavior which are of paramount importance to Jews.”

Despite the finding that Askenazi Jews are highly prone to development a high-investment reproductive strategy, perceptions of the possibility of upward social mobility had a profound effect on the life-history strategy of European Jewish populations. Western-European Jews were relatively quick to adopt a low-fertility/high-investment strategy in response to possibilities for upward social mobility. Jews in Germany and other Western societies entered the demographic transition considerably earlier than gentiles in the same society and achieved a remarkable level of social and economic success (e.g., Goldstein, 1981; Knode, 1974). Moreover, Jewish fertility changed from being higher than gentile fertility to being lower than gentile fertility in the aggregate (e.g., A. Goldstein 1981; Knode 1974; Ritterband 1981). This shift to a higher-investment style of childrearing was accompanied by theoretically expected demographic markers of high-investment parenting, including low rates of infant and adult

mortality compared to gentiles even after controlling for SES, as well as lower levels of illegitimacy, premarital conception, and divorce rates (Cohen 1986; Goldstein 1981; Guttentag & Secord, 1981).

However, Jewish populations in Eastern Europe behaved quite differently during the same period but under quite different circumstances. Throughout the 19th century, Jewish populations in Eastern Europe had the highest rate of natural increase of any European population, e.g., rising from one to six million in the Russian Empire (Alderman 1992, 112; Frankel 1981, 103; Lindemann 1991, 28-29, 133-135). This population explosion was accompanied by high rates of poverty within the Jewish population in the context of official state-sponsored quotas on Jewish enrollment in universities and limitations on Jewish economic activities. In addition, in Russia, the home of the majority of the region's Jews, the vast majority of the Jewish population was forced to live in a geographically limited area, the so-called Pale of Settlement. Despite the emigration of close to two million Jews to America and elsewhere, many Eastern European Jews remained in very difficult economic straits.

The response of the Eastern European Jewish communities to this state of affairs was to adopt a high fertility style of reproduction. At the same time as their counterparts in Western Europe were delaying marriage, having fewer children and rapidly advancing socially and economically (Efron 1994, 77), poor Jews in Eastern Europe with no hope of upward mobility married earlier and had relatively large numbers of children. There was also a tendency to be attracted to messianic forms of political and religious ideology. Within Russian Jewish communities, the acceptance of radical political ideology often co-existed with messianic forms of Zionism as well as an intense commitment to Jewish nationalism and religious and cultural separatism, and many individuals held various (often rapidly changing) combinations of these ideas (see Frankel 1981).

High fertility, religious fanaticism, and messianic expectations have been a typical Jewish response to anti-Semitic persecutions throughout history (e.g., Scholem 1971; MacDonald 1994, Ch. 3). The general pattern can also be seen in the Ottoman Empire where there was a shift in Jewish behavior from a low-fertility strategy during the early period of Ottoman rule (15th century) to a high-fertility strategy during the period of decline in Jewish fortunes. In the earlier

period, Jews were prominent as physicians and in trade, commerce, manufacturing, finance, and tax farming. This flourishing Jewish culture came at a time when Jews formed an intermediary between the alien Ottoman elite and the subject populations (Lewis 1984, 139).

After this period, there was degeneration of Jewish culture, accompanied by early marriage and a high birth rate (Lewis 1984, 141)—clearly indicative of a shift to a low-investment style of parenting. The decline in Jewish culture co-occurred with anti-Jewish actions. Jews became increasingly degraded in the Ottoman Empire, and their decline was far more extreme than can be explained solely by the economic fortunes of the Ottoman Empire, since it affected them far more than their Muslim and Christian co-residents. By the mid-18th century until the intervention of the European powers in the 20th century, there was “an unmistakable picture of grinding poverty, ignorance, and insecurity” (Lewis, 1984; p. 164) in the context of high levels of anti-Semitism that effectively prevented Jewish upward mobility (see MacDonald 1994, Ch. 7). These phenomena were accompanied by the prevalence of a high fertility, low investment parenting style and the prevalence of religious mysticism with messianic overtones. In the long run the community became too poor to provide for the education of most children, with the result that the great majority were illiterate and they pursued occupations requiring only limited intelligence and training.

However, when presented with opportunities for upward social mobility, Jewish populations quickly develop a low fertility/high investment reproductive strategy. We have already seen that in Germany during the 19th century, the Jews were the first group to enter the demographic transition and take advantage of opportunities for upward social mobility by having fewer children. When the oppressed Eastern European Jews emigrated to America and were able to achieve upward mobility, they quickly developed a high-investment, low-fertility strategy, with the result that American Jews—the vast majority the descendants of Eastern European Jews—have the lowest fertility rate of any American ethnic group (e.g., Lieberman and Weinfeld 1978, 16). And with the resurgence of Ottoman Jews in the 19th century resulting from patronage and protection from European Jews, once again there was a decline in fertility and religious messianism as well as a flowering of a highly literate culture, including secular schools based on Western models (see Shaw, 1991; p. 143ff, 175-176). Further corroborating this

pattern, North African Jews migrating to France after World War II developed a pattern of having fewer children, marrying later, having a higher percentage of university graduates, and more frequently entering white-collar, professional occupations than those immigrating to Israel (DellaPergola 1986). The suggestion is that the overall pattern of the Jewish response to economic adversity combined with lack of opportunity for upward mobility and anti-Semitism is to facultatively adopt a relatively low-investment, high-fertility style of reproduction combined at the ideological level with various forms of messianism. Opportunities for upward mobility, however, result in the adoption of a relatively high-investment, low fertility reproductive strategy.

INTERACTION BETWEEN PARENTAL INVESTMENT AND CULTURAL SUPPORTS FOR HIGH INVESTMENT PARENTING

Given the evidence that life history patterns are heritable, it is expected that cultural supports for children's behavior will be most important at the low-investment end of the parental investment distribution, and especially so in a society in which upward mobility is possible. This is because the children of high-investment parents are internally motivated to accept parental values and to attend to parents as models of appropriate behavior. Moreover, independent of parental influences, they are likely to be more prone to adopt a high-investment pattern of behavior because of their genetic proclivities even in the absence of parental influences. Children on the low-investment end of the distribution, on the other hand, are expected to be relatively little motivated to accept adult values (low internalization). And, independent of internalizing parental influences, children on the low-investment end are expected to be more prone to cultural choices involving immediate gratification and low-investment sexual relationships, as well as more prone to choosing cultural influences, including peers, disapproved by adults.

Cultural supports for high-investment parenting act as external forces of social control which act to maximize high-investment parenting among all segments of the population, even those who are relatively disinclined for genetic and/or environmental reasons to engage in such practices. One may view cultural supports for high-investment parenting as a form of external social control that is formally analogous to externalizing methods of parental discipline.

In the contemporary world, systems of parental socialization of children must compete with other influences. Especially important are the peer world, the media, and other influences emanating from the wider culture whose values often conflict with parental views on appropriate sexual behavior. There are also secular trends in external influences, especially in the media and the wider culture, that impact on the parent-child system. In some historical eras, there has been more congruence between the wider culture and parental values than at others. As a result it is reasonable to suppose that children's internalization of parental values occurs more easily at some historical periods than at others.

The historical data on marriage in Western societies indicate that traditionally there have been very low levels of divorce and illegitimacy, even during periods of relative economic hardship (MacDonald, 1995a). The prototypical response to environmental adversity has been to delay reproduction and there has been a consistently low level of illegitimacy during periods of economic decline as well as periods of economic prosperity (see also above). Moreover, there is excellent evidence that this pattern was maintained by powerful social controls embedded in the religious and legal framework of Western societies. For example, during the medieval period the Church successfully opposed divorce, concubinage, and illegitimate birth for all classes of society, including the wealthy; engaging in these behaviors resulted in social opprobrium. And in later periods women and lower- and middle-status males were important interest groups that maintained these cultural supports for high-investment parenting.

However, since approximately 1965 there has been a massive cultural shift away from these traditional patterns toward a dramatically increasing prevalence of a low-investment reproductive style in the United States and other Western societies. The interesting point from the present perspective is that there has been a powerful interaction between this cultural shift and individual tendencies toward high-investment parenting.

Since 1970 the rate of single parenting has increased from 1/10 families to 1/3 families (Norton & Miller, 1992), and there have been dramatic increases in teenage sexual activity and teenage childbearing without marriage (Furstenberg, 1991). There is excellent evidence for an association among teenage single parenting, poverty, lack of education, and poor developmental

outcomes for children (e.g., Dornbusch & Gray, 1988; Furstenberg & Brooks-Gunn, 1989; McLanahan & Booth, 1989; Wilson 1993).

Indeed, all of the trends related to the family show very large shifts which developed in the mid-1960's (Herrnstein & Murray 1994, 168ff), including increases in trends toward lower levels of marriage, "cataclysmic" increases in divorce rates (p. 172), and rates of illegitimacy. In the case of divorce and illegitimacy rates, the data indicate an enormous shift upward during the 1960's from previously existing trends, with the trend lines established during that period continuing into the present. Clearly the 1960's was a watershed period in American social and cultural history.

Whatever the cause of these secular trends, Herrnstein and Murray (1994) show that these changes in social functioning have not fallen evenly across the continuum of parental investment. For example, only 2% of the white women in Herrnstein and Murray's top category of cognitive ability (IQ minimum of 125) and 4% of the white women in the second category of cognitive ability (IQ between 110 and 125) gave birth to illegitimate children, while the corresponding rates for the bottom two categories of cognitive ability are 17% (IQ between 75 and 90) and 32% (IQ below 75) respectively. Thus the cultural shift in which the traditional social controls characteristic of historical Western societies have been severely attenuated has had little effect on individuals predisposed toward high-investment parenting. However, the attenuation of these controls has resulted in a massive alteration of behavior among individuals who are not so inclined.

There is evidence that an important contributor to this cultural shift in reproductive behavior is low paternal investment in children. Marriage, far more than mother's IQ, is the most important variable in predicting poverty among children and its correlative negative developmental outcomes (Herrnstein & Murray, 1994, 138). Moreover, the adolescent girls who are most likely to become pregnant are least under the control or influence of adults, especially fathers. For example, Herrnstein & Murray (1994) found that father-absence at age 14 was a strong predictor that the woman's first birth would be illegitimate. Given the general association between precocious adolescent sexual behavior and a variety of deviant behaviors (see above), it

is relevant that Dornbusch et al (1985) found that single parenting is associated with lower levels of parental control of adolescents and higher levels of deviant behavior by adolescents.

These results are consistent with supposing that the decline of social controls on reproductive behavior tends to result in low-investment parenting among those so inclined. In this scenario, the effects of social controls interact with individual tendencies toward parental investment which are in turn influenced by genetically-influenced individual differences in life history strategy.

However, there are other considerations: Given the general importance of perceptions of the effects of reproductive decisions on social status discussed previously, one could interpret the results as consistent with the hypothesis that individuals on the low end of the IQ distribution do not perceive that adopting a low-fertility, high-investment pattern of child rearing will result in upward social mobility for themselves and their children. There appear to be three possibilities related to perceptions of social mobility: Such individuals may (correctly or incorrectly) believe that adoption of a low-fertility, high-investment strategy will not in fact raise the social status of themselves or their offspring. Like the Eastern European Jews in the 19th century, contemporary lower class populations may believe that there are no opportunities for upward social mobility and therefore engage in a low-investment/high-fertility life history strategy.

In this regard it is relevant that Herrnstein and Murray (1994) summarize their own and others' data indicating that since the early 1960's in the United States, IQ has been linked with upward social mobility independent of economic deprivation during childhood and independent of ethnicity. Therefore if indeed high-fertility/low-investment parenting among lower status people occurs because of a perception of lack of opportunities for upward social mobility, this perception is in fact false. The suggestion is that in the contemporary United States individual differences in reproductive strategy may well not be influenced by the perception that upward social mobility is not possible.

Secondly, low-IQ individuals who engage in low-investment parenting under contemporary conditions may be low on the personality trait of Conscientiousness and therefore less able to defer gratification, engage in sustained work, use birth control consistently, persevere in long term goals, etc. This is the interpretation of Lynn (1996). Lynn provides evidence for an

inverse association between Conscientiousness and social class and fertility in contemporary populations, and shows that downward social mobility is linked to low levels of Conscientiousness. He also provides evidence that the trait of Conscientiousness is heritable, with correlations between identical twins reared apart suggesting a heritability in the 0.6 range.

And finally, such individuals may be less motivated by the possibility of upward social mobility: If indeed social status seeking is an evolved motive disposition, it would not be surprising to find genetic and environmental influences on individual differences in this motive, as with other evolved motive dispositions (MacDonald 1991). Indeed, social dominance and achievement striving are linked psychometrically to Factors I (Surgency, Dominance) and III (Conscientiousness) of the Five Factor Model of personality respectively. Individual differences in these factors are heritable (Digman, 1990).

On balance, given the heritability of IQ and other behaviors related to parental investment, the most likely hypothesis for the failure to adopt a low-fertility/high-investment reproductive profile in a context where such a profile does in fact lead to upward social mobility is simply that this pattern is substantially affected by genetically-influenced individual differences in life history strategy. Nevertheless, the inculcation of the belief that lack of social mobility among individuals in the lower social and economic classes is not due to their relative lack of intelligence or other abilities but rather results from discrimination against their ethnic group, sex, or social class has been a common component of political rhetoric since the beginnings of the modern world. If indeed this rhetoric is false but believed by lower status people, people's life history strategies may to some extent be based on false perceptions of reality.

In any case, the data reviewed in this section indicate the importance of considering complex processes of social control and their interaction with individual differences in life history strategies in attempting to understand historical influencing life history strategies. At a theoretical level, social controls on reproductive behavior may be viewed as influenced by evolved motivational systems and conflicts of interest over the construction of culture. Nevertheless these social controls are underdetermined with respect to evolutionary theory, human nature/nurture (i.e., the characteristics of humans), or external ecological variables

(MacDonald, 1995a). And while understanding the origins of important cultural shifts, such as those occurring during the 1960's, clearly takes one a long way from developmental psychology and evolutionary biology, the conclusion must be that behaviors related to life history strategizing occur in a highly embedded, socially constructed cultural context.

CONCLUSION

One message of the foregoing is the coherence of individual development. An evolutionary perspective is certainly compatible with the general idea that specific, highly dedicated systems will evolve as a response to highly specific adaptive problems. For example, the human affectional system as a highly dedicated system that functions to make family relationships rewarding and, ultimately, to produce high-quality children (MacDonald 1992). Adolescents are relatively prone to impulsivity and risk taking behavior (including behavior related to low-investment sexual relationships). Within an evolutionary approach to personality systems, these traits may be conceptualized as domain-specific elements of behavioral approach systems (Factor I of the Five-Factor Model). These traits are also psychometrically and neurophysiologically linked with aggression, dominance, and attraction to reward, including attraction to sexual behavior (MacDonald, 1995b).

However, while domain-specific systems are of undoubted importance in conceptualizing human development, there is also a fundamental coherence to development centered around intelligence as a powerful domain-general human faculty. The big picture is that there is a very large and socially important coherence to individual development. On the whole, more intelligent people are better parents and they are prone to providing affectionate, supportive, and stimulating environments for children. They are also better role models, and their children are more likely to attend to them and be concerned with parental approval of their behavior. The children of these high-investment parents are also better able to benefit from all of this parental solicitude.

From an evolutionary perspective, this very large coherence of individual development makes excellent adaptive sense. Parental investment looms as a critically important activity which has a unifying force on development because it is intimately related to reproductive

success in ancestral environments. All things being equal, individuals who invest highly in children must be able to incorporate themselves in viable family relationships, and they must be able to inhibit attraction to short term gains (e.g., low-investment sexual relationships) in favor of long term benefits. Correspondingly, their children must be programmed to benefit from the added attention and the better advice their parents are able to provide.

Another major message here has been that although human life history strategies are heritable, they are also highly sensitive to environmental stressors as well as perceptions of the possibility of upward social mobility. Because of the very clear effects on physical development and the onset of reproductive competence, the response to environmental stress is presumably an evolved response for a relatively K-selected and/or adversity-selected organism. However, this may not be the case for perceptions of the possibility of upward mobility. This response may well be a secondary consequence of individuals' perceptions of immediate costs and benefits of reproductive decisions and may not involve any specialized evolutionary mechanisms.

One could suppose that the default mechanism is to adopt a high-fertility, early-marriage strategy. However, in the event that people perceive that such a strategy will result in poverty while delaying marriage and having fewer children would result in relative economic ease and an increase or maintenance of one's social status, there is a shift to a later-marriage, low-fertility strategy. This shift is not an evolved alternate strategy, but is rather a result of a conflict between two universal human motivational systems. Conflicts between evolved motivational systems are undoubtedly quite common, as indicated by evolutionary analysis of human personality systems (MacDonald, 1995). For example, men may have conflicts between desires for intimate social relationships and the excitement and pleasure of sexual promiscuity. These goals may be incompatible in particular situations, but both motivational systems are adaptations.

In the case of reproductive strategies, there may be a similar conflict between evolved motivational systems. Humans universally view children as costly but desirable items (Turke, 1989). However, the motive to maximize the number of surviving offspring may conflict with the evolved motive to increase or maintain social status. If it does, as in the period following economic modernization for Western European populations, then for many people the desire for higher social status results in delayed marriage, low fertility and high investment in children.

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However, people who do not perceive themselves as able to take advantage of opportunities for upward social mobility by delaying marriage and restricting fertility are much less inclined to do so than those who perceive the status advantages of adopting a low-fertility strategy.

Nevertheless, there is every reason to believe that the ability and inclination of individuals to take advantage of the possibility of upward social mobility is importantly influenced by genetically influenced individual differences: People vary in their inclinations toward high-investment parenting and, presumably, in the importance they attach to high social status.

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