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Age preferences in mates reflect sex differences in human reproductive strategies

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Abstract: The finding that women are attracted to men older than themselves whereas men are attracted to relatively younger women has been explained by social psychologists in terms of economic exchange rooted in traditional sex-role norms. An alternative evolutionary model suggests that males and females follow different reproductive strategies, and predicts a more complex relationship between gender and age preferences. In particular, males' preferences for relatively younger females should be minimal during early mating years, but should become more pronounced as the male gets older. Young females are expected to prefer somewhat older males during their early years and to change less as they age. We briefly review relevant theory and present results of six studies testing this prediction. Study 1 finds support for this gender-differentiated prediction in age preferences expressed in personal advertisements. Study 2 supports the prediction with marriage statistics from two U.S. cities. Study 3 examines the cross-generational robustness of the phenomenon, and finds the same pattern in marriage statistics from 1923. Study 4 replicates Study 1 using matrimonial advertisements from two European countries, and from India. Study 5 finds a consistent pattern in marriages recorded from 1913 through 1939 on a small island in the Philippines. Study 6 reveals the same pattern in singles advertisements placed by financially successful American women and men. We consider the limitations of previous normative and evolutionary explanations of age preferences and discuss the advantages of expanding previous models to include the life history perspective.

Keywords: attraction; ethological theory; evolution; gender differences; life history strategies; mate selection; sexual selection; similarity; social exchange

1. Introduction

In his 1908 *Social psychology*, William McDougall explained human heterosexual attraction in Darwinian terms. In adopting an evolutionary perspective, McDougall followed William James (1890), whom McDougall replaced at Harvard. The evolutionary perspective adopted by these early functionalists was rejected by psychologists who entered the field after the 1920s. Recent research, however, indicates that evolutionary models might be quite useful for explaining certain aspects of human social behavior (e.g., Buss 1989; Daly & Wilson 1988a). The ultimate perspective of evolutionary theory may be particularly pertinent to reproductive behavior, which is arguably the first line of evolutionary pressure (Barash 1982; Daly & Wilson 1983). Differential reproductive success is, after all, at the heart of natural selection.

Although social psychologists and evolutionary biologists have mutual interests in reproductive behavior, they have, historically, shared little theory and research with one another. This is unfortunate for several reasons. One reason is that social psychologists have generated a number of empirical findings that could be parsimoniously explained within an evolutionary framework. Because social psychologists usually fail to consider the role that evolutionary pressures might have played in human heterosexual attraction, however, many of these findings have been viewed as anomalies (Kenrick & Trost 1989). Another reason is that evolutionary biologists lose a valuable source of data when they ignore the social psychological literature, which has produced an abundance of findings with implications for evolutionary models (Kenrick & Trost 1987). A combination of the two literatures could lead to new hypotheses that would not follow from either perspective in isolation.

In this target article, we consider a phenomenon that has been addressed by both social psychologists and evolutionary biologists, but which has not been fully explored by either. A number of social psychological studies have indicated a sex difference in preferred age of mates. We argue here that this sex difference is not well explained by traditional social psychological models. An alternative evolutionary explanation can encompass sev-

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eral findings and lead to new predictions. Evolutionary theorists have not generated enough data to distinguish between the social psychological and evolutionary explanations of this phenomenon, however, nor have they considered how age preferences interact with other factors that emerge from social psychological studies of attraction. We present data collected with different methods, across different generations, and from several different cultures suggesting that human mate selection is based, in part, on the partner's reproductive potential and, in part, on the partner's similarity to the subject.

1.1. Social exchange and the preference for similar mates

Prevailing social psychological models of mating preference adopt a view of relationships as a form of economic exchange (see, for example, Clark & Reis 1988; Huston & Levinger 1978; and Walster et al. 1978). These economic models see potential partners as seeking an equitable bargain in a marketplace of mate competition. For example, Cameron et al. (1977) observed that the singles' advertisements they examined in their research suggested a "heterosexual stock market." They also observed that: "The ads in this paper read a little bit like the ask-bid columns of the New York Stock Exchange. Potential partners seek to strike bargains which maximize their rewards in the exchange of assets." (Cameron et al. 1977, p. 28)

According to these models, a common mechanism for achieving equity in the exchange process is to choose a partner who is similar to oneself. Social psychologists who study relationships often quote Erving Goffman's statement that: "A proposal of marriage in our society tends to be a way in which a man sums up his social attributes and suggests to a woman that hers are not so much better as to preclude a merger or partnership in these matters." (Goffman 1952, p. 456)

To support these models, social psychological theorists frequently point out that mates are matched on a great variety of characteristics (Antill 1983; Byrne 1971; Critelli & Waid 1980; Hendrick 1981). These include physical attractiveness, wealth, religion, personality, political attitudes, degree of psychopathology, and even personal habits. Social psychological theorists invoke economic exchange to explain the similarity findings. Partners presumably attempt to match themselves with others who have similar social value. Note that "economic exchange" does not refer solely to the exchange of money; individuals' economic value is assumed to be based on social, physical, and intellectual assets, as well as their financial status. In fact, a woman's social economic value may bear only a slight relation to her wealth, as is discussed in more detail below.

The exceptions to the principle that "like prefers like" are few and worthy of careful examination. One consistent exception to the principle is the finding that females are attracted to older males, whereas males are attracted to younger females (Bolig et al. 1984; Cameron et al. 1977; Harrison & Saeed 1977). Economic models attribute this age preference complementarity to gender discrepancies in social value. Females presumably exchange youth and physical attractiveness for economic security (Brehm 1985). But why are youth and physical attractiveness "overvalued" by males, and economic resources "overvalued" by females?

Economic models generally explain mate selection in terms of historically arbitrary normative pressures. As one author puts it, "*traditionally, in our society*, males have been valued for their economic success, and females for their physical attractiveness" (Brehm, 1985, p. 76, emphasis ours). Similarly, Cameron et al. (1977) explain their finding that females prefer older, taller, high status males as the result of "traditional sex-role specifications . . . frequently valued as sex appropriate *in American society*," which specify that women should "look up to" their male partners (p. 29, emphasis ours).

Along similar lines, Deutsch et al. (1986) speculated about Sontag's (1979) suggestion that there is a "double standard of aging" *in our society:*

> . . . with increasing age women's sexual desirability is thought to decrease, and women's sexual desire and interest are considered increasingly inappropriate. . . . Even the standards of physical attractiveness differ for men and women. . . . Those for men are less stringent and less connected to youth, whereas for women any sign of advancing age is an indication of diminished attractiveness. . . . This equation of female beauty with youthfulness may reflect the more general ideal of femininity as a childlike state. (pp. 771–72)

Although social psychologists do not usually examine cross-cultural data, the above quotes reveal a tacit assumption that there are other societies in which gender differences in mate preference are fundamentally different from those found in our society. Along these lines, Rosenblatt (1974, p. 87) advanced the following reasoning: "I suspect that female beauty is more important where women have little control over whom they marry and little power in the family, and that feminine attractiveness is not noticeably more important than male attractiveness where women have as much say as men about whom they marry and about what goes on in their families."

1.1.1. Problems for normative social exchange models. A number of findings pose difficulties for an explanation of mate selection that is limited to the norms peculiar to our society. We have reviewed several of these problems elsewhere (Kenrick & Trost 1989); two are summarized below:

1. Cross-cultural research indicates that males and females in other cultures differ in ways that are consistent with the gender differences found in our own society. For instance, females in different cultures value social status in males more than do males, and males in different cultures value a potential mate's physical attractiveness more than do females (e.g., Buss 1989; Symons 1979; see also multiple book review *BBS* 3(2) 1980). Given the great variability of many human characteristics from culture to culture, finding invariance across cultures is evidence that supports a species-specific, rather than a culture-specific, explanation (Plutchik 1980).

2. Comparisons across mammalian species reveal a number of sex differences that parallel those found in humans. For example, dominance is more important for male than for female attractiveness in a number of other primate species (Sadalla et al. 1987; Trivers 1985) and has been linked to the hormone testosterone in humans and

other species (Bancroft 1978; Dabbs et al. 1987; Mazur & Lamb 1980).[2]

We believe that female preference for dominance across different mammalian species is closely related to the preference of human females for wealth and social status. Evolutionary theorists assume that a man's economic resources would have been important to our female ancestors for at least two reasons: (a) They could have been used to make a direct contribution to offspring success; (b) they would have suggested the possession of characteristics that, if passed on to the offspring, would make them more competitive in a social hierarchy. In addition to the theoretical arguments for equating a male's status, wealth, and social dominance, empirical data suggest that these factors have similar effects on contemporary women's preferences (Kenrick et al. 1990). This issue is discussed in more detail below.

These and other findings of parallel gender differences across human cultures and across species conflict with more complicated social psychological theories that explain gender differences in terms of norms peculiar to a particular society. As we try to show below, these gender differences can be parsimoniously explained in terms of general biological principles.

1.2. The evolutionary perspective on heterosexual relationships

Evolutionary models agree in several respects with the social psychological economic models. [See Caporael et al.: "Selfishness Examined," *BBS* 12(4) 1989.] For example, both models assume the use of social strategies that balance potential costs and benefits in the interest of motivations that are, at some level, selfish (Cooper 1987; Frank 1988; Kenrick & Trost 1989). They differ in several important ways, however. Social psychological models assume a more or less conscious weighting of rewards and costs, emphasizing "perceptions," "expectations," and "attributions" in the assessment of equity (Brehm 1985; Walster et al. 1978). The value placed on any particular reward or cost is presumably influenced by cultural norms (e.g., Deutsch et al. 1986). An evolutionary model, on the other hand, bases the exchange process not on arbitrary norms, but on the hard currency of biological fitness and reproductive value. These processes are not necessarily accessible to conscious calculation but reflect evolved adaptations that may operate below the level of consciousness.

An evolutionary model can incorporate the social psychological findings and can parsimoniously explain cross-cultural similarities, cross-species similarities, and hormonal effects on gender-linked mating behaviors. In the following sections, we briefly review several general principles of the evolutionary approach that we use to develop specific predictions about age and attractiveness.

1.2.1. Life history, reproductive effort, and differential parental investment. Evolutionary biologists assume that each species has evolved a characteristic life history adapted to the particular ecological problems encountered by its ancestors (e.g., Alexander 1987; Partridge & Harvey 1988; Stearns 1976). A life history is a genetically organized set of general strategies and specific tactics for allocating energy to survival, growth, and reproduction (Crawford & Anderson 1989). In general, life histories can be divided into somatic effort and reproductive effort (Alexander 1987). Somatic effort directs energy to building the body and can be thought of as amassing resources. Reproductive effort is the expenditure of those resources in the interest of reproducing the animal's genes. Alexander (1987) further divides reproductive effort into mating, parental care, and extraparental nepotistic effort (or the provision of resources for siblings).

There is a wide variety of life history patterns. For example, small birds like chickadees breed in their first spring and every year thereafter. Pacific salmon develop over a three-year period and "breed in a single suicidal burst as three-year-olds" (Partridge & Harvey 1988, p. 1449). Like salmon, red deer wait several years before beginning to breed, but like chickadees, they continue to breed for several years (Clutton-Brock et al. 1982). A critical point of life history models is that reproduction entails costs to the animal's individual survival. Some costs are direct physiological ones, as animals sacrifice their own bodily resources for their offspring. For example, female elephant seals lose two kilograms for every kilogram gained by their pups (Trivers 1985). Other costs are indirect, as animals work for and protect their offspring. For example, male stickleback fish expose themselves to greater risks of predation when there are relatively more eggs in the nests they are guarding (Pressley 1981). As Partridge and Harvey (1988) note, there is an "implicit trade-off between fecundity and mortality." Animals (like the salmon) that end their lives in the act of reproduction demonstrate the trade-off most dramatically. This pattern is called *semelparity*, colorfully defined by Stearns (1976, p. 4) as: "The big bang reproductive pattern; giving birth only once and committing suicide in the process. . . ." The pattern of giving birth several times in a lifetime is called *iteroparity*. Evidence suggests that there is a trade-off between mating and longevity even in iteroparous species (Daly & Wilson 1983). For example, lizards with high fecundity are less likely to survive from one mating season to the next (Tinkle 1969); a similar relationship has been found in studies of red deer (Clutton-Brock 1984). Drosophila that are experimentally denied the opportunity to mate live longer than those given access to mates, and this effect obtains for males as well as for females (Maynard Smith 1958; Partridge & Farquhar 1981).

Just as reproductive strategies differ across species, so do they differ within species (Darwin 1859; Trivers 1985). For example, males in some species of fish may develop into more than one adult form, depending on both genetic differences between males and ecological conditions confronted during development. Male bluegill sunfish, to take one example, may develop into either large parental males, or smaller males who attempt to cuckold the larger males. The parental males mature at a later age, court females, and guard the eggs in their nest. The smaller males attempt sneak copulations, darting in to release sperm after a female has laid her eggs, but before the larger male has fertilized them (Gross 1984).

The most important division of reproductive strategy within a species is often related to gender. One species of fly (*Johannseniella nitida*) provides a vivid example (Parker 1970). After copulating with a female, the male deposits his genitalia as a plug to prevent other males

from mating with the same female. The female then consumes the remainder of the male's body. Although this fly is an unusual example, evolutionary models assume that males and females will generally use somewhat different reproductive strategies. In one marsupial (*Antechinus stuartii*), the male is semelparous (expending all his bodily resources during mating competition and copulation, and then dying), whereas the female may be iteroparous (surviving to mate in more than one season).

1.2.2. Differential parental investment. The concept of differential parental investment is important in understanding sex differences in reproductive strategy (Trivers 1972). The sex investing more in the offspring will generally be more selective in choosing a mate. In most animal species (but not all), females have a higher initial investment in each potential offspring than males do. Consider, in particular, the mammalian reproductive pattern. Female mammals, compared to males, heavily invest their own bodily resources in each offspring (through pregnancy and lactation). These costs limit any given female to mothering fewer offspring than a male is potentially capable of fathering. For this reason, mammalian females tend to be more selective about mates, and mammalian males tend to compete amongst themselves for mating opportunities (Hinde 1983; Symons 1979; Trivers 1972; Williams 1975).

This general mammalian model must be qualified in its application to humans. Because human males invest heavily in their offspring, they will also be selective about choosing a mating partner (Buss 1989; Daly & Wilson 1983; Kenrick et al. 1990; Symons 1979). Humans are among a minority of species in which males invest very heavily in their offspring. It is a general rule that as males invest more heavily in potential offspring, they become more selective about the characteristics of acceptable female mates (Trivers 1985).

Because human males and females both invest heavily in their offspring, they are both expected to be selective about their partner's characteristics. Nevertheless, males and females invest different resources and should be expected to value different characteristics in a mate. Males invest relatively more indirect resources (food, money, protection, and security), and females invest relatively more direct physiological resources (contributing their own bodily nutrients to the fetus and nursing child). For this reason, females who are choosing mates are assumed to pay particular attention to a male's ability to provide indirect resources, and males are assumed to pay special attention to signs of a female's apparent health and reproductive potential.

A number of researchers have found support for the assumption that women value men who show characteristics related to resource acquisition. For example, Sadalla et al. (1987) manipulated a target individual's social dominance several ways across several experiments. In each case, dominance enhanced a man's attractiveness to women, but had no influence on a woman's attractiveness to men. Similarly, Buss (1989) found that a potential mate's social status was more important to women than to men across 37 different cultures (see also Hill 1984; Mealey 1985). Likewise, Kenrick et al. (1990) found that characteristics related to dominance were more central criteria in a woman's than in a man's choice of dates, sexual partners, and long-term mates. On the other hand, both Buss and Barnes (1986) and Kenrick et al. (1990) found that males valued a potential partner's physical attractiveness more highly than did females. Several authors have suggested that physical attractiveness might be important to males as an indirect means to assess age and physical condition (e.g., Buss & Barnes 1986; Symons 1979). There is some indirect evidence supporting this reasoning; cues for youthful appearance are related to ratings of a woman's physical attractiveness (Cunningham 1986). Mathes et al. (1985) asked subjects of different ages to judge the physical attractiveness of photographs of males and females of different ages. Compared with younger women, older women were judged less physically attractive by judges of both sexes and all ages. Photographs of older men were not judged as less attractive than those of younger men.

1.2.3. Sex differences in human life history strategies. Human males and females differ in the way they divide their lifetime energy resources between somatic effort and the various components of reproductive effort. Males mature more slowly, grow to a larger size, and invest more energy in attracting mates (Alexander 1987; Daly & Wilson 1983). As just noted, females invest more of their somatic resources in parental care. After approximately age 50, human females go through menopause, and cease the direct production of young (Menken & Larsen 1986). Note that menopause is not necessarily the end of reproductive effort, however. Reproductive effort includes not only mating and the production of offspring, but also the care of those offspring. Alexander (1987) speculates that female menopause might have evolved because a woman's reproductive success depends on tending the offspring she has produced. Naturalistic studies of other animal species have demonstrated that, beyond a certain age, females and their offspring suffer increasingly high mortality (e.g., Clutton-Brock 1984). Maternal age in humans has been connected to increasing health problems for the pregnant and nursing mother, as well as offspring genetic defects and perinatal mortality (Resnik 1986). During most of human evolutionary history, a woman who reached age 50 was likely to have had several offspring, some of whom might still be directly dependent on her for survival, and some of whom might have offspring of their own that could profit from grandparental care. Under those circumstances, the costs involved in further production of infants were likely to have outweighed the benefits of caring for existing offspring and grandchildren.

Males do not undergo the physiological changes of menopause. Although males do physically decline with age, and in fact die earlier than females, they do not in general lose the ability to reproduce. A recent report concluded:

> A review of the available studies on testicular function in old age provides neither biochemical nor morphological evidence for a physiological process in men that could be compared to the female climacteric. . . . All investigators agree that the alterations in testicular and pituitary function observed in senescence occur over long periods of time and remain subtle compared to the sudden and profound changes in gonadal function during female menopause. . . . While women lose

their reproductive capacities during the menopause, sustained androgen and sperm production indicate that impotence and infertility are not a corollary of advancing age in men. (Nieschlag & Michel 1986, p. 69)

Because our male ancestors did not contribute their own bodily resources to offspring, the costs of reproduction for older males did not outweigh the benefits. In fact, the indirect resources that a male contributed, such as skills in hunting or toolmaking, might well have continued to accrue with his age. Because the majority of human societies have been somewhat polygynous (Daly & Wilson 1983), older males with resources sometimes had the opportunity to acquire additional younger wives (Mealey 1985). Thus, the benefits of reproduction during a male's later years might well have continued to outweigh the costs.

2. A prediction: Age preferences change over the lifespan

A consideration of lifespan changes in residual reproductive value (Fisher 1930) leads to a prediction that would not follow from the social exchange models. Several evolutionary theorists have discussed male age preference in mates and emphasized the reproductive advantages in male's preference for youth. Williams (1975) recognized the importance for males of the fact of female age-dependence in fertility. He suggested that, "the value of copulation for the male would be described by the age-distribution of female fertility." While recognizing the lack of data on the point, he predicted a universal male attraction to sexually mature but youthful women as the most important standard of beauty (p. 128). Symons (1979) in turn speculated on the age at which females should be most attractive to males, predicting 23–28 ± 2, ". . . if males have been designed by selection to 'evaluate' females primarily as sex partners," and 17–22 ± 2 if ". . . designed by selection to 'evaluate' females primarily as wives." (p. 189)

Although evolutionary theorists have touched on the relationship of female age to attractiveness, they have not fully articulated the differences between men and women over the lifespan, nor have they considered how age preferences would interact with other factors known to influence mate choice (e.g., similarity). In addition, evolutionary theorists have not generated data that would distinguish evolutionary from sociocultural explanations. We consider below how the different reproductive life histories of males and females lead to predictions of gender differences in age preferences that change across the lifespan.

2.1. Male choice

We hypothesize that males will weigh at least two considerations in the choice of a female partner – similarity and reproductive potential. Our expectation that similarity will be important was derived from the overwhelming empirical evidence for the similarity/attraction phenomenon in the social psychological literature (e.g., Byrne 1971), including findings of age similarity in friends (Rushton 1989). Byrne has shown that interactions between people who are relatively similar to each other are experienced as more rewarding than interactions with dissimilar individuals. A history of positive interactions will generalize to similar individuals in new situations. When we are looking for new partners, past positive associations with family members, playmates, and others who have been positive toward us in the past, including age mates, will have conditioned us to favor similar individuals (Byrne 1971).

Our prediction for a preference for similarity was generated from the strong empirical support for such a phenomenon in social psychology. The notion of attraction for genetic similarity (Rushton 1989) has difficulty accounting for a preference for similar age, because similar age is no indication of genetic similarity. The preference for similar age in a male, however, is not incompatible with a more general evolutionary perspective. It is important to consider that "reproductive effort" means more than simply effort involved in mating; it also includes parental effort. The evidence suggests that the most common pattern of parental effort throughout human history has been one in which men and women bond together in the care of the offspring (Daly & Wilson 1983). To the extent that common habits and common cohort history facilitates cooperative and friendly relations between parents the same way that they do between friends and dating partners (Byrne 1971), age similarity carries some reproductive advantage. We return to the issue of similarity preference later. The critical point we make now is that despite the advantages of similarity between parents a strong countervailing pressure operates to prevent relying on a strict similarity criterion.

Because a female's reproductive potential declines more rapidly, the preferred age of a male's partner should change as he ages. For a teenage male, the differences in remaining reproductive years between women his age and those a few years older are not great, and slightly older females have the advantage of higher fertility. Thus, a teenage male would be expected to show little or no discrimination against women a few years older than he. For a male in his 40s, however, a woman's remaining reproductive years should become a more important consideration that acts against using similarity as a sole criterion. Whereas aging males should prefer progressively older women (because of similarity), they should also prefer women progressively younger than themselves (to maximize reproductive opportunities).

2.2. Female choice

The evolutionary model does not offer as clear a prediction for females. Males mature later than females, which may reflect the past pressures of intrasexual selection mediated by male competition for females (Ghiselin 1989). During our ancestral past, a young teenage male was therefore less physically ready to compete with larger males a few years older. As a corollary, very young males may have been unable to provide physical protection or resources for females their own age. Whatever the ultimate genesis, earlier maturation in females suggests a history in which females mated with older males, and we would expect young females to prefer relatively older males. Once a male reaches full maturity, he continues to accrue economic resources for several decades (e.g., Jencks 1979), and he also accumulates such indirect

resources as social status that females value in a mate (Buss 1989; Kenrick et al. 1990; Sadalla et al. 1987). He loses physical resources in the form of health and virility, however, and his economic position may also begin to drop as he ages (e.g., Jencks 1979). Older males decrease their rate of copulation, and a lowered rate of copulation is in turn related to lessened probability of insemination (James 1974). As we noted above, however, testosterone and sperm counts in older males remain adequate for fertilization.

Leonard (1989) discusses a factor that would incline females against choosing males who are much older than they are:

> Females . . . should show a preference for males who have achieved full maturity and high rank, which will typically mean older males, but perhaps males still young enough to retain effectiveness as providers until the females' last reproductive efforts have reached adulthood. If one assumes (conservatively) that a female marries at age 20 and can expect to bear her last child no later than age 40, and that that child will require some degree of parental care until age 20, then if pair bonds are long-lasting, she should prefer a male who is currently a good provider and likely to remain so for 40 years. This would mean a male older than she is, but not much more than 10 years older (p. 26).

Leonard's reasoning could be extended to older females choosing a mate. Compared with a 20-year-old, a 30-year-old female would have 10 fewer years of expected remaining parental care, and could "afford" to marry a slightly older man, with fewer remaining productive years, but more present resources.

In summary, males are hypothesized to begin with a preference for females around their own age, but, as they grow older, to develop a preference for women who, although not absolutely younger, are progressively younger than themselves. We hypothesize that females will begin with a preference for older males, and compared to males, show less variation in that preference over their lifespan. This gender and age-differentiated prediction was tested in six studies.

3. Study 1: Age preferences in mate advertisements

Several social psychologists have looked to classified newspaper advertisements as an unobtrusive measure of economic exchange in the mating process (e.g., Harrison & Saeed 1977). "Lonely hearts" advertisements allow for the nonreactive naturalistic examination of mating preferences, and social psychologists have regarded them as particularly well suited for examining what are usually tacit economic exchange considerations. Because earlier researchers considered only the general "norm" that females mate with older males and found support for that expectation, they did not further partition the preference data. A test of the present hypothesis calls not only for separating male and female advertisers, but also for dividing them by the advertiser's age.

We analyzed a sample of 218 personal advertisements from three issues of a "singles" newspaper (the *Arizona Solo*). We used only advertisements that specified the age of the advertiser, and that indicated a minimum and/or maximum desired age for a partner. When these data were broken down by the advertiser's gender and decade of age, they yielded the pattern shown in Figure 1.

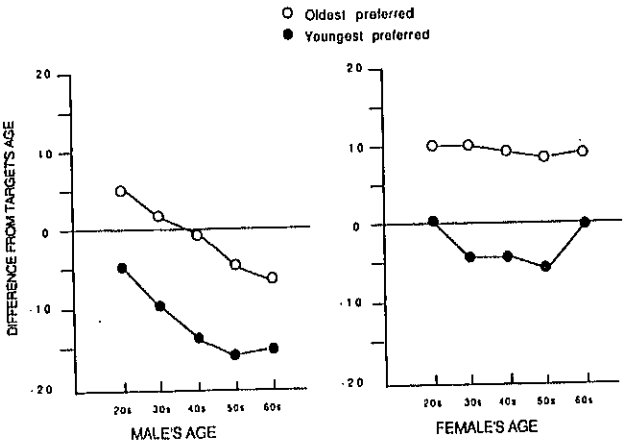

Figure 1. Age differences preferred in mate advertisements, plotted as minimum and maximum differences from advertiser's age.

As can be seen in the figure, female specifications remained fairly constant throughout the age range. Females were interested in partners who, on average, ranged from 0 to 5 years younger, and from 8 to 11 years older than themselves. Males, on the other hand, changed their preferences in a systematic fashion as their own age increased. Males in their 20s were equally attracted to women above and below their own age, specifying partners ranging, on average, from 5 years younger to 5 years older. As males got older, however, their preferences increasingly diverged from those of females in the same age group. Among males in their 50s and 60s, the maximum acceptable age was several years below their own age, and the minimum specified was almost a generation discrepant from their own age. Analyses of variance indicated a significant sex x decade interaction for both minimum (F, 4, 190 = 3.81, $p < .01$), and maximum age differences (F, 4,190 = 2.97, $p < .02$). Analyzed separately by sex, male advertisers showed significant decade changes for both minimum (F, 4, 126 = 18.56, $p < .001$) and maximum preferences (F, 4, 126 = 13.96, $p < .001$). There was a significant, but smaller, decade difference for female advertisers' minimum preferences (F, 4, 63 = 4.34, $p < .01$). The variations in females' maximum preferences were not significant (F, 4, 63 = 1.05, $p > .39$).

When age preferences from mating advertisements are examined more carefully, they yield results that were not predicted by social economic models. If there is a "norm" for men to prefer younger women it should show up most markedly in younger men, who tend to be more concerned with behaving in a stereotypically sex-typed manner. A number of studies have found that men become less concerned with gender-specific norms as they age (e.g., Deutsch et al. 1986). The interesting feature of younger men's preferences, however, is that they extended equally above and below their own ages. Thus, these data provide no evidence that a preference for younger women is a consistent feature of the normatively defined role for males.

The results do fit well with an evolutionary model. The

data from Study 1 are inherently limited, however. For one thing, preferences expressed in singles advertisements may not reflect preferences in the larger population. For another, such preferences may not transfer into actual reproductive behaviors because they may be limited by a number of constraints. Although older males might be interested in females 15 or more years younger than themselves, for example, they must still deal with female preferences. The choice of a marriage partner is, after all, mutual, rather than unilateral; people may not get what they want. In addition, other factors, including physical attractiveness, personality, and preferences for similarity on other dimensions could all act to weaken the importance of initial age preferences in actual mate selection.

4. Study 2: Marriage age statistics

Because of the inherent limitations on advertised preferences, we examined age differences in actual mate choice, as reflected in marriage statistics. Our first sample included all the marriages (n = 753) for the month of January 1986 in a large city in the western United States (Seattle, WA). We first analyzed the data using the male's age as the predictor, and his partner's age as the dependent variable. We next analyzed the same data using female's age as predictor. The results are depicted in Figure 2.

Those results are consistent with the evolutionary model, and they fall cleanly within the preference ranges found in Study 1. Using age of male as predictor variable, the change over the decades yields an F (5,752) = 41.90, p < .001. A comparable analysis using female age also yields a significant F, but it is much smaller in magnitude (3.42).

To guard against the possibility that spurious factors might have influenced the data for the month of January 1986 in Seattle, WA, we also collected data for the same month, and from May 1986 from another large western U.S. city (Phoenix, AZ). The overall Phoenix population of cases was larger, and we randomly sampled 436 marriages from the two months. Because preliminary analysis revealed that the two months did not differ from one another, they are collapsed for presentation in Figure 3.

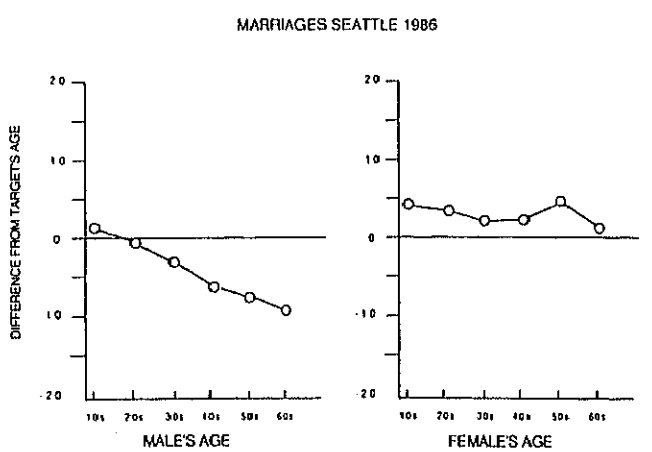

Figure 2. Actual age differences in marriages for Seattle, WA, January 1986, plotted according to husband's and wife's ages.

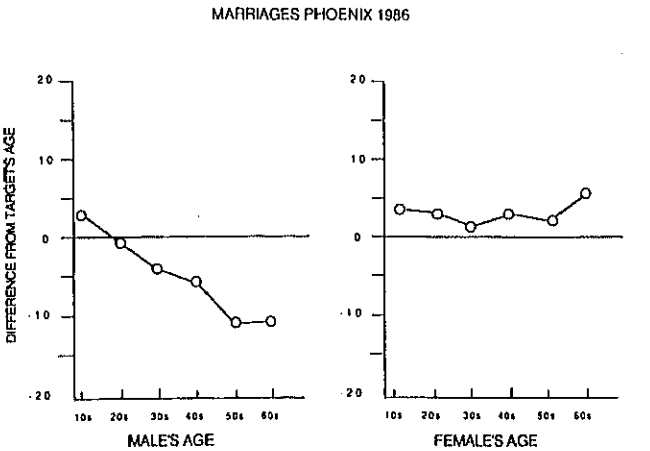

Figure 3. Actual age differences in marriages in Phoenix, AZ (aggregated for January and May 1986), plotted according to husband's and wife's ages.

Once again, the same sex difference obtains. As predicted by our evolutionary model, the age of a man's wife significantly decreased in relation to his own age as he got older (F, 5, 435 = 30.81, p < .001). An analysis using female's age as predictor again produced a statistically significant, but much smaller F value (F, 5, 435 = 2.25, p < .05). As examination of the figure indicates, women usually married men who were just a little older than they were. As men grew older, they tended to marry women who were younger and younger relative to their own age.

In summary, data from two distinct geographical regions of the United States suggest that the age preferences expressed in singles advertisements reflect general population preferences that translate into reproductive behavior. Marriage patterns from the two cities fall squarely within the preference limits specified in Study 1.

5. Study 3: Cross-generational analysis

From an evolutionary perspective, human mate preferences reflect selection pressures that have occurred over several million years. If the sex differences described in the above studies reflect past evolutionary constraints, they should be relatively impervious to changing norms, such as those that have affected sex roles in the United States during the latter half of this century. This is a relatively conservative prediction because evolutionary theorists assume that behaviors influenced by human genetic predispositions are modifiable by features of the physical and cultural environment (Lumsden & Wilson 1981). In fact, natural selection can result in variable behavior patterns for several reasons. If an animal's ancestors encountered a variable environment, that could select for a *facultative* strategy in which certain environments lead to certain behavioral strategies, and other environments lead to different such strategies (see Crawford & Anderson, 1989, for a more extensive discussion). Environmental factors that might lead to facultative variations in the magnitude of age discrepancies are discussed below. We would expect the general sex difference in age preference to be a robust effect, however, because the selection pressure on males to prefer increasingly younger females is likely to have been consis-

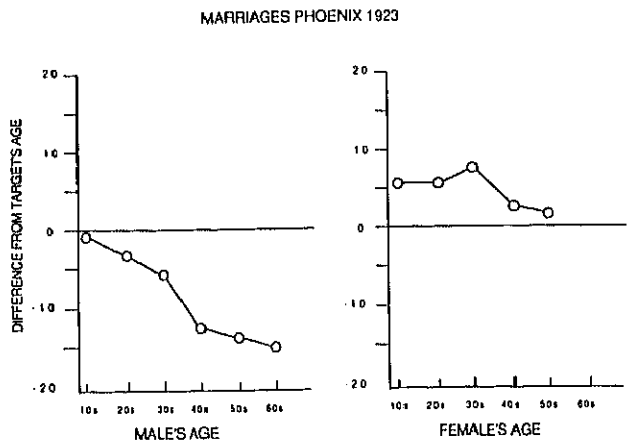

Figure 4. Actual age differences in marriages in Phoenix, AZ, 1923, plotted according to husband's and wife's ages.

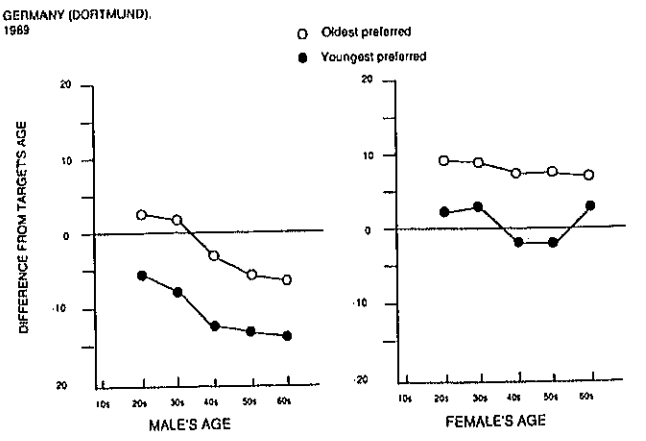

Figure 5. Age preferences stated in German singles advertisements, plotted as minimum and maximum differences from target's age.

tent over our evolutionary history. The persisting differences in the reproductive life histories of males and females would serve to anchor the age discrepancies in mate preferences against short-term variations in the cultural milieu.

Assuming a historically unidirectional selection pressure on males to prefer females of reproductive age, we would predict a similar age-discrepant pattern in mating ages during our grandparents' generation. To test this prediction, we analyzed a sample of 100 marriages recorded in Phoenix, AZ, for 1923 (the earliest year for which well-organized records were available). The results are depicted in Figure 4.

These data conform reasonably well to the pattern of the data from the 1980s. Once again, the age of a man's partner decreases directly with his age (F, 5, 99 = 8.07, $p < .001$). The changes in women's age preferences were not significantly different across decades ($F < 1$).

Thus, the sex differences in age choices have shown consistency across generations despite changes in sex-role norms during the intervening historical period.

6. Study 4: Mating advertisements in different cultures

An evolutionary model would also lead us to predict that these sex differences in the preferred age of a partner would be consistent across cultures. As we noted earlier, facultative mechanisms could have evolved to vary the size of the sex discrepancy to fit varying ecological conditions. Several of these factors are discussed in a later section, but again note that the consistent evolutionary pressures for age-related changes in male preference should lead to some consistency in the pattern of sex discrepancies across cultures.

We analyzed personal advertisements from Germany and Holland and found that the pattern in both countries is essentially the same as the pattern in American advertisements (see Figures 5 and 6).[3]

It could be argued that European countries are not the best test of the cross-cultural robustness of this phenomenon, because American society is deeply rooted in European culture. Matrimonial advertisements in Indian newspapers provide a somewhat more distinct source. Although Indian culture also has connections to European culture, Indian marital advertisements indicate very different cultural criteria from those seen in American advertisements. Most advertisements include strict limitations by caste and religion, and they commonly request horoscope information. For instance:

> Wanted: a non-Bharadwaj smart good-looking preferably employed Kerala Iyer girl below 25 for a Kerala Iyer boy 29. Chemical engineer. Contact with horoscope.
>
> (*Times of India*, Bombay, Sunday, Jan. 29, 1989)

As earlier, we selected advertisements that included the advertiser's age, and that stipulated a minimum and/or a maximum age for preferred partners. Unfortunately, we found no advertisements for women above age 40 in our sample. As an Indian informant explained to us, Indian women who do not marry by their 40s are not considered marriageable. Nevertheless, the gender differences in the pattern of the data are similar to those found in the American sample (Figure 7).

These advertisements indicate that, as they age, males prefer increasingly younger females, whereas females continue to prefer males slightly older than themselves. The analysis for a gender × decade interaction yields an F

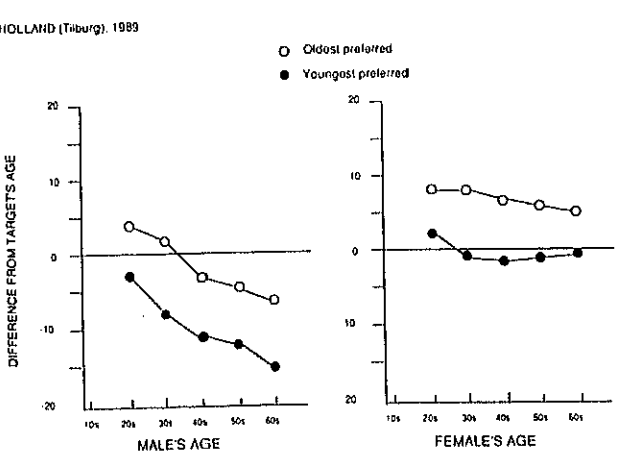

Figure 6. Age preferences stated in Dutch singles advertisements.

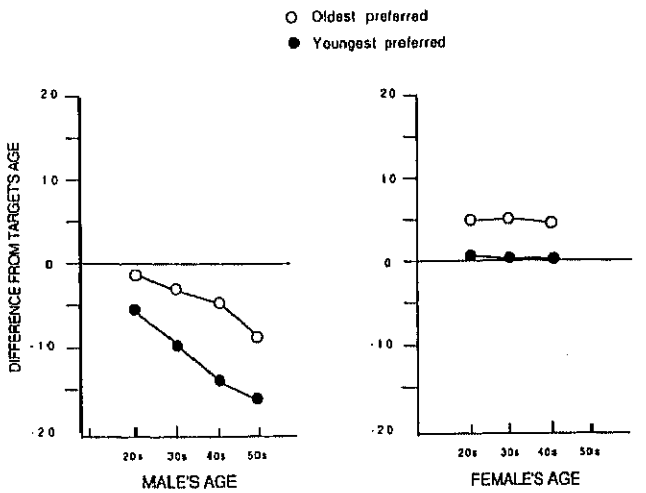

Figure 7. Age preferences stated in Indian matrimonial advertisements.

(4, 106) = 8.03, $p < .001$ for the minimum age preferences, and an F (4, 176) = 2.51, $p < .08$ for the maximum age preferences. Analyzed separately by gender, males' preferences changed significantly across decades for both minimum (F, 3, 57 = 28.89, $p < .001$) and maximum age preferences (F, 3, 96 = 12.65, $p < .001$). Females' age preferences did not differ significantly across decades for either minimum (F, 2, 46 = 2.36, $p > .10$) or maximum age preferences (F, 2, 83 = 0.24, $p > .78$).

7. Study 5: Marriage ages on a small Philippine island, 1913–1939

As an additional test of the cross-cultural and cross-historical robustness of the age discrepancies in mate choice, we examined marriage ages on the island of Poro between the years 1913 (the earliest year for which records were available) and 1939. Poro is a small isolated island in the Visayas region (approximately 500 kilometers southeast of Manila), with its own distinct dialect. The natives of Poro had little contact with Europeans or Americans during the years studied. The economy was based on fishing and agriculture. Because of the relatively small size of the community, we were able to examine the total sample of marriages during these years (n = 1511).[4] As in Studies 2 and 3, we analyzed the data using male age as the independent variable and the discrepancy between his age and his wife's age as the dependent variable. We then analyzed the data using the wife's age as the independent variable. Results are depicted in Figure 8.

When analyzed using male age as the dependent variable, the pattern was consistent with that found in the studies discussed above – a consistent increase in age discrepancy as the male aged (F, 5, 1510 = 124.76, $p <$ .001). Once again, the youngest males married women close to their own age (0.69 years discrepancy for teens), whereas the oldest males married women much younger than them (20.75 years discrepancy for men in their 60s). Women's preferences also showed changes over the lifespan (F, 5, 1510 = 13.94, $p < .001$), but women at all ages married men slightly older, and the changes across decades did not manifest the consistent downward trend shown in the male data.

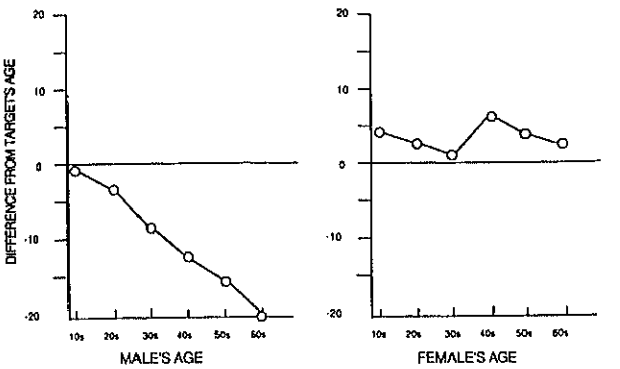

Figure 8. Actual age differences in 1,511 marriages on the island of Poro (1913–1939), plotted according to husband's and wife's ages, respectively.

We also separately analyzed the 278 marriages recorded between 1913 and 1920, to provide the most historically distant test. The pattern was exactly the same for that earliest sample. As men aged, they showed a consistent increase in the tendency to marry relatively younger women (F, 5, 278 = 35.91, $p < .001$). Women married slightly older men at all ages (3.37 years, on average), and there was no significant effect of the woman's decade of age (F, 5, 278 = 1.47, $p > .20$). These data argue strongly against the sociological explanation of age discrepancies that attributes them to norms based in modern "cultural images" of "an advertising culture" (Neal, cited in Winegar 1989).

8. Gender differences in economic resources

As we noted earlier, social psychological models sometimes attribute the gender difference in emphasis on youth and attractiveness to culturally bound differences in economic resources. As Margolin and White (1987) note:

> One social norm clearly related to this asymmetry is the long-standing tradition for beautiful women to trade their looks for economic status in cross-gender relationships. . . . For centuries women have relied on the commodity value of physical appearance to achieve upward mobility because, in comparison to men, they have had little else to bargain with (p. 22).

As we noted earlier, Rosenblatt (1974) speculated that such gender differences would be less pronounced in societies in which women had more wealth and power. It is also consistent with an evolutionary perspective that wealth might influence age preferences in a mate. As we noted above, wealth can affect an individual's ability to make indirect contributions to offspring survival. As discussed below, it might also have an indirect influence on the aging process itself. Nevertheless, other research has indicated that traditional sex differences in mate preference persist even with increases in social status and wealth (Townsend 1989). That is, high status men continue to weight physical attractiveness more highly than do high status women, and high status women continue to weight status and wealth relatively more highly than do high status men. Thus, high status American women and men continue to demonstrate the same differences that

Buss (1989) found across numerous cultures. We would therefore not expect social status to erase the pattern of sex differences found in the other data sets reported above.

Actually, some segments of modern American society may provide a reasonable test of these speculations. Compared to women in hunter-gatherer and agrarian societies, contemporary urban professional women are much more equivalent to men in wealth and status. Although this increase in power has not occurred for all women in our society, it is possible to examine women whose personal socioeconomic status exceeds not only the status of most males in other cultures and historical epochs, but also that of the average American man. Certain newspapers and magazines, like the *New York Review of Books* and *Washingtonian* regularly include personal advertisements from women of higher socioeconomic status. Consider the following advertisement:

> Wealthy attractive DWF 49, brown-eyed brunette, 5'4" 120 lbs., wants tall handsome blue-eyed monogamous unmarried gentleman, no dependents, 50–65 for long term relationship. (*Washingtonian*, June 1989)

We analyzed advertisements in *Washingtonian* magazine that indicated a minimum and/or a maximum age preferred in a partner and that specified the age of the advertiser. In addition, we coded the ads in terms of information related to the advertiser's wealth and social status (hereafter SES). The analysis divided advertisers into those who specified that: (1) they were wealthy or had a professional occupation (physician, lawyer, etc.), or (2) no information or specific mention that they were not wealthy or in a relatively low-paying occupation (e.g., clerical or secretary). Relatively more males than females listed themselves as wealthy or professional. Out of 182 men, 129 reported themselves as high SES, versus 84 out of 184 women. Results including this variable are depicted in Figure 9.

As indicated in this figure, the basic sex difference found in the earlier studies also obtained in this study. Specifically, there was the predicted gender × decade interaction for both maximum (F, 3, 365 = 18.42, $p < .001$) and minimum age differences (F, 4, 369 = 12.07, $p < .001$). There was also a two-way interaction of wealth and decade (F, 3, 365 = 3.083, $p < .05$). This interaction indicated that the two SES groups showed an increasing discrepancy as they aged. This is consistent with the idea that wealthier people indicate more interest in relative youth as they grow older. A three-way interaction would have indicated that the sex × decade interaction was different for high SES versus low/no info subjects. There was no three-way interaction for either maximum or minimum age differences preferred (both Fs < 1.30, ps > .25). For exploratory purposes, we nevertheless examined the data separately by gender and social class. Neither women nor men showed a significant interaction of wealth and decade for either the high or low preferred difference. Consistent with the two-way interaction reported above, however, there was a similar marginal tendency toward a decade by wealth interaction for both men (F, 4, 170 = 2.10, $p < .09$) and women (F, 3, 191 = 2.39, $p < .08$) on the lowest age preferred. The analogous F's for the high differences were both less than 1, suggesting no differences between the social class groups for the highest age preferred.[5]

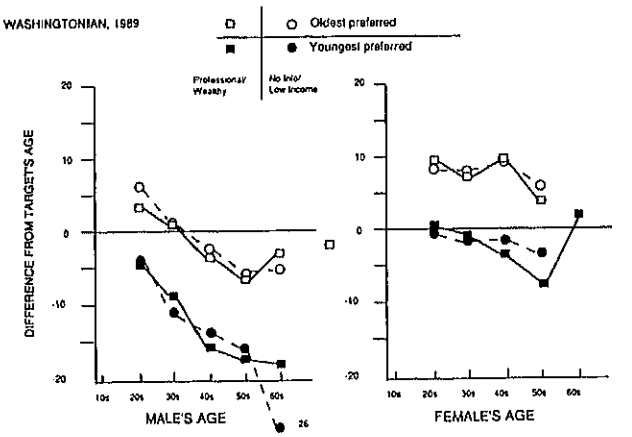

Figure 9. Age preferences stated in *Washingtonian* magazine, with separate plotting for those specifying high SES.

In summary, the interaction between gender and age persists even among those at the highest levels of income. Wealth does have a weak effect on preferences for youth. That effect is independent of gender, so that the differential gender pattern remains among wealthy individuals. Unlike older men, wealthy older women are still interested in men their own age and older, but as they grow older, wealthy people of both sexes show a relatively lower "floor" in the ages in which they are interested.

9. Discussion

The data we have presented indicate that age preferences are more complex than earlier social psychological models led us to expect. Earlier studies suggested a simple relationship: Males seek younger females and females seek older males. Our results are consistent with half of that generalization; females tend to seek males who are slightly older than they are. For males, however, the preference for younger females is weak or nonexistent during early years, but becomes increasingly pronounced with age.

Previous authors, although failing to note the developmental variations in the gender discrepancy in age preference, observed that the basic age discrepancy seemed somewhat irrational economically. As Cameron et al. (1977) note, "since the average age of the women advertisers was over 9 years older than that desired by male advertisers, a serious problem of matching is evident." Bolig et al. (1984) likewise note, "The men who placed profiles in this magazine were not looking for the women who placed profiles (nor were the women looking for these men)." The preferences of older females indicate an interest in males who are themselves interested in much younger women. Given the general tendency for males to prefer younger females, however, the older females may be following a somewhat "rational" strategy. On the other hand, if the goal of these advertisements is simply to maximize the probability of acquiring a partner, males would fare better by expressing an interest in females in their own age range, as well as in younger females. Given

that females in his own range are likely to be more interested in him than are females 15 years younger, the older male would find rewards more readily available if he did not exclude women of his own generation from his range of interest. In short, older males are seeking neither the most similar nor the most available partners, and they are pushing the limits of the female age preferences (which have a ceiling 8 to 10 years above the female's own age). Male preferences thus appear irrational from the simple economic exchange model. An evolutionary model, which predicts that males attempt to maximize their reproductive possibilities, makes sense of these data, however. One of the major commodities that males are seeking is reproductive potential.

In general, these data demonstrate little support for the assumption that gender differences in age preference are the result of normative pressures of "American society" (Cameron et al. 1977). Two features of these data pose problems for that normative explanantion. First, the same pattern is found in all of the cultures we examined, despite wide variation in other features of mate choice across those societies. Second, young males express preferences for, and often marry,women older than themselves. Implicit in the notion of normative control of behavior are the assumptions that: (1) norms are shared by the members of a culture; (2) norms are backed by social sanctions (Schaffer 1983). If the norm in question is, "Men should be attracted to and marry younger women," neither of those assumptions seems to match these young men's choices. As we discuss below, we believe that normative pressures can contribute to age preferences in mate selection, but our data are not consistent with the assumption that such pressures explain the overall differences between the sexes.[6]

These data are more compatible with evolutionary models of mate selection. In particular, the changes in male preferences across the lifespan are a relatively straightforward derivation from the assumption that males will be interested in a female's fertility or general reproductive value. As we noted, however, the lifespan changes that result from that preference have generally not been spelled out (e.g., Buss 1989; Symons 1979). Earlier evolutionary treatments have also tended to ignore the issue of female preferences over the lifespan. Our data fit reasonably well with Leonard's (1989) speculation that females will prefer men who are older, but whose expected remaining productive lifespan is yoked to the female's remaining years of expected reproductive effort. As discussed below, differential lifespan changes have important implications for the differential availability of mates for the two sexes.

More important, evolutionary theorists have tended to ignore the issue of preference for similarity in age. Although Rushton (1989) does mention assortative mating for age he does so in the context of a discussion of a preference for genetic similarity (to which, as we noted earlier, age similarity does not apply well). Sloman and Sloman (1988) offer another evolutionary explanation of preferences for similarity. They suggest that it is a by-product of the association between physical attractiveness and position in status hierarchies, arguing that individuals choose partners as attractive as they can get, which results in matching. This model does not apply smoothly to age preferences, although it may bear indirectly on changes in the ratios of men and women getting married at different ages (see discussion section 9.6 below).

9.1. Similarity and long-term reproductive effort

We believe the life history model provides a strong theoretical perspective from which to consider the preference for similar-aged mates. This model leads us to consider reproductive effort as the sum of independent efforts toward mating and the care of siblings and offspring. We are thus led to focus not only on the production of new offspring but also on the long-term investment in those offspring. During much of human evolutionary history, offspring survival would have been a chancy business. As nomadic hunter-gatherers, females appear to have provided the bulk of child care and contributed substantial calories to the diet, while men hunted and provided crucial protein as well as protection. The long developmental period of human children would probably have coevolved with cooperative tendencies in parents of both sexes. In comparison with other mammals, human males contribute a greater amount of care to their offspring. Although a preference for novel and young sexual partners would have contributed to a male's mating effort, any preference that led to bonding and cooperation with a mate would have contributed to parenting effort and increased fitness through the increased survival of offspring. Extended interactions over long periods between mates would have been easier if the partners had similar expectations, values, activity levels, and habits. A preference for similarity in age, all else being equal, would have made the long-term cooperation of mates more feasible and thus adaptive. As indicated in the social psychological literature discussed earlier, similarity of all kinds leads to increased bonding and cooperation. Thus, humans may have evolved with a preference for similar mates, including similarly aged mates, because of the advantage to parenting effort this would have contributed. To the extent that humans engage in grandparental investment, preference for similar (and potentially more compatible) partners would have potential benefits even for older males, as we discuss below. In summary, some weighting of similarity makes evolutionary sense for both sexes when one considers that human reproductive effort has involved a great deal more than producing offspring; it also involved cooperative care for those offspring and for their offspring.

9.2. Differential sex ratios as an alternative explanation

One interesting potential explanation of these results considers the differing ratios of males and females that are available as potential mates over the lifespan. In a thought-provoking analysis, Guttentag and Secord (1983) have noted historical variations in several social trends as a function of sex ratios. For example, there was a dramatic increase in the ratio of women to men from 1960 to 1970, and a concomitant increase in sexual permissiveness. Guttentag and Secord (1983) note a number of other parallel historical examples of the same pattern, as in ancient Athens and Sparta, where differences in sex ratio

covaried with differences in sexual mores. They argue that when the sex ratio is low (few men to women) men are required to make less commitment to individual partners, and females are less able to make demands for such commitment. On the other hand, when the sex ratio is high, societies tend toward more traditional mores, marriages are more stable, and sexual restraint and fidelity are more honored. Although these authors explain the underlying motivation toward relative male permissiveness in terms of social norms, a simpler argument could be made from an evolutionary viewpoint, and the same result would be expected.

Guttentag and Secord also note that "women typically marry men who, on the average, are 2 or 3 years older" and speculate that "this situation prevails because there are fewer men in the higher than in the lower age . . . brackets." Although these authors do not consider the age-related changes in marital age preferences across the lifespan, a *BBS* reviewer of a previous draft of the present paper suggested the interesting possibility that a sex ratio analysis could be extended to explain those changes (Lippa, personal communication).

Although differential sex ratios might explain some variation in age preferences, they do not seem sufficient to drive the pattern we have observed here. Assume for the moment that both sexes placed a premium on youth. Because there are fewer available men than women in the older categories, men are in a "buyer's market" and are thus in a position to demand more youth than females. That explanation fails to explain other features of our data, however. For example, there are usually more available men than women in their 20s (partly because more women marry in their teens, and partly because more women in their 20s marry older men). If women did indeed prefer youth, women in their 20s (now in the buyer's market) should show the least inclination toward marrying older men. And yet, across all of our data sets, there is a slight tendency for women in their 20s to show the most interest in *older* men.

Similar problems ensue if one adopts a sex ratio explanation in combination with the assumption that everyone begins wanting older (and presumably more resource rich) partners. Why then would older men *rule out* older partners? The prediction that all people would prefer similar-aged partners likewise fails to explain the older male's data. For the sex ratio argument to begin to explain the pattern of age preferences, one has to add the assumption that when men are in the more powerful bargaining position, they will prefer youth, but when women are in the more powerful bargaining position they will prefer maturity and the resources that accompany it. That brings one back to the question: Why do men (and not women) prefer relative youth in the first place? And why does the pattern of age changes persist across different cultures and time-periods (and presumably variations in sex ratios as well)? Guttentag and Secord argue that women do not act directly on their bargaining power because males control the resources of all societies, and thus when women have the superior bargaining position, men react by requiring women to observe a more familial morality. A simpler explanation might be that both men and women do take advantage of their bargaining position, but men and women do not have the same priorities where youth and resource availability are concerned.

Guttentag and Secord present substantial data showing that sex ratios vary substantially over time, and have, during this century, been related to substantial changes in marriage, divorce, and fidelity. For example, during the 1920s the sex ratio in the United States was at its most positive – that is, there were relatively more men than women. By the 1980s that pattern had reversed to its most negative – with more available women than men. That reversal also occurred in Phoenix, AZ (Department of Commerce, Bureau of the Census 1930; 1984). If differential sex ratios were driving the phenomenon we have observed, the pattern we found in Phoenix during the 1980s should have been very different in the 1920s. As a comparison of the results of Studies 2 and 3 shows, that was not the case.

Thus, it is not apparent how a sex ratio argument could explain the data we have presented. Nevertheless, we are not ready to rule that out as a factor contributing to sex differences in age preference. Perhaps further analysis will reveal that sex ratios interact with other relevant factors in this domain, or perhaps a more complex application of this model could be developed.

9.3. Facultative variations in age preference?

Figure 10 compares the patterns from the two data sets that were the most similar culturally – advertisements and marriages in Phoenix in the 1980s. Figure 11 compares the data from the two most diverse data sets culturally – *Washingtonian* advertisements from the 1980s and Philippine marriages from the first part of the century. It is apparent that the overall pattern is a robust one. There do seem to be some differences, however. In particular, note that marriages for the Philippine men are at the most extreme end of choices for wealthy American males. Research examining differences across different groups, as well as individual differences within groups, could provide some insights into the underlying mechanisms for, and limiting conditions of, the gender differences we have reported here. In the following sections we consider this issue in detail.

In our earlier discussion of life history strategies, we noted that the same-sexed members of a given species will often alter their reproductive life histories in keeping

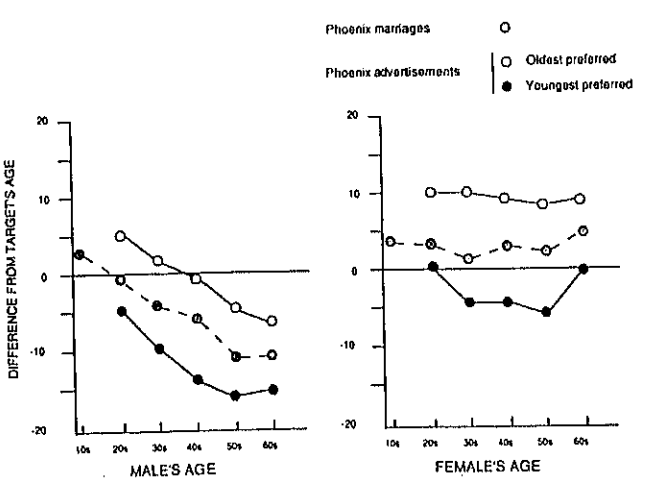

Figure 10. A comparison of marriages and personal advertisements in Phoenix during the 1980s.

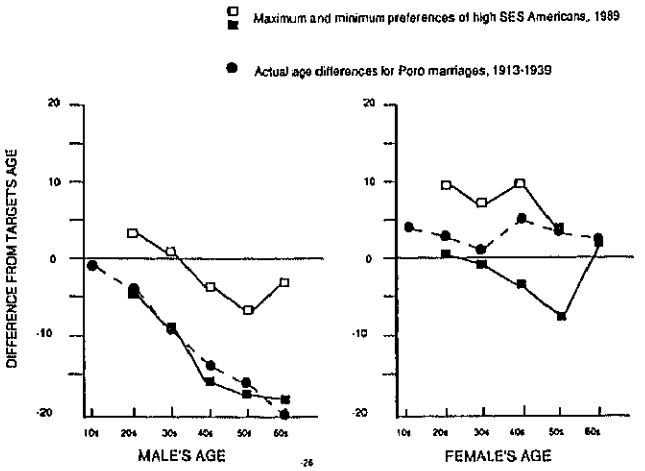

Figure 11. A comparison of preferences expressed by high status Americans in 1989 with marriage ages on Poro between 1913 and 1939.

with ecological variations (Crawford & Anderson 1989). It may be that age preferences within a sex vary systematically with cultural and individual factors (Symons 1979; Williams 1975). Although the data from India and the Philippines are generally consistent with the pattern we obtained in the United States (and the one observed in two European countries), they are not identical. We would expect a more extensive cross-cultural data collection to reveal interesting interactions with cultural factors. In a reanalysis of Buss's (1989) cross-cultural data, for example, Glenn (1989) found that age differences in mates were more pronounced in less developed countries. Buss's data were not broken down by the subject's age, but the data we obtained from India and the Philippines are consistent with Glenn's point. As shown in Figure 5, matrimonial advertisements for Indian males showed the same general changes with age as the other samples. Even advertisements for young males specified relatively younger females, however. Similarly, Philippine marriage data do not show the tendency in modern American marriage data for teenage males to marry slightly older women, but instead show a slight preference for younger women (even among teenage males). And as Philippine men aged, the discrepancies between their ages and those of their wives increased more dramatically than in the modern American data. It is interesting to note that the Philippine data are more consistent with the American data from the 1920s.

These variations suggest several factors that might be examined in future research. In a society in which men would expect marriage to last for a lifetime, a female's remaining reproductive years might be weighted more heavily than immediate fertility (see Thornhill, 1989, for a related discussion). In a society in which relationships were often short-lived, on the other hand, fertility might be weighted more heavily. The former circumstance would lead to maximum valuing of teenage women; the latter would lead to maximum valuing of women in their 20s. Another relevant factor might be infant mortality. If infant mortality were low, then the value of remaining reproductive years would diminish relative to fertility. Similarly Nur (1989) notes that differences in age preferences should vary with the age of peak fertility and peak reproductive value across societies, and Symons (1989) points out that societal differences in the age at which a woman typically bears her first children will be related to male's age preferences. [See also *BBS* multiple book review of "The Evolution of Human Sexuality" *BBS* 3(2) 1980.]

Sex differences in age preferences might also be expected to vary with the expected length of a *particular* relationship. Other research indicates that gender differences in mate preferences are generally most pronounced for casual relationships (Kenrick et al. 1990). For example, compared with their criteria for a date, males indicate lower criteria for acceptable intelligence in a sexual partner, particularly when the relationship is specified as a one-night encounter in which the partners will never see one another again (Kenrick et al. 1990). Females, on the other hand, demand more intelligence for a sexual partner than for a date. The same pattern (sex differences most pronounced in considering criteria for a sexual partner) obtains for a number of characteristics besides intelligence. Following this line of reasoning, males of all ages might be expected to be less choosy about a female's youthfulness in a low-investment, casual sexual relationship. Although females are usually more choosy about a sexual partner, a different pattern might be expected for age preferences. If a woman expects little or no resource investment from a male partner, then his age should be relatively less important, in contrast to other features that would be expected to correlate with qualities that would enhance offspring fitness (see Leonard 1989).

9.4. The interaction of the organism, the environment and cognition

It should be clear from the preceding discussion that we do not consider age preferences in males and females to be based only on some simple "hard-wired" mechanism. Indeed, although evolutionary hypotheses often focus on genetic explanations, modern theorists assume that organismic predispositions unfold only in interaction with the environment. [See also Johnston: "Contrasting Approaches to a Theory of Learning" *BBS* 4(1) 1981 and "Developmental Explanation and the Ontogeny of Birdsong" *BBS* 11(4) 1988.] Evolved mechanisms require environmental inputs to develop and environmental inputs to trigger them, and they may be enhanced or inhibited by other relevant factors in the immediate or the developmental environment. In addition, these evolved mechanisms interact with cognitive factors, including attention, expectation, schema activation, and goal orientation.

We have elsewhere discussed an interactionist approach to other psychological processes, including depression and aggressiveness (Kenrick 1987; Kenrick et al. 1985). Briefly, a biological predisposition may be one factor in a multiplicative equation that also includes environmental events and cognitive interpretation. For example, a predisposition to depression may arise from certain genetically based biochemical thresholds, but it will not be activated without inputs from the environment (e.g., repeated failures, loss of resources, disease, certain weather conditions) and it can be enhanced or inhibited by cognitive factors (e.g., maladaptive in-

terpretations of social feedback, rumination on perceived environmental threats). [See also Anisman & Zacharko: "Depression" *BBS* 5(1) 1982.]

In this target article we have focused on a possible evolved mechanism for age preferences in mate selection. We assume that such a mechanism, like depression or aggression, does not operate in a vacuum, but interacts with features of the environment and with such cognitive processes as attention and interpretation. We sometimes forget an important fact about the aggregated data presented in most behavioral studies – the general patterns rarely if ever describe every individual subject in a sample. In a nomothetic sense, the phenomenon we have been describing is, for social behavior, a very robust one – it replicates quite reliably across a wide range of conditions. Individual subjects showed wide variation in their preferences, however, and in their choice of marriage partners. There were older men who sought, and others who married, women their own age. And there were older women who sought, and others who married, men younger than themselves. Like most other preferences, the gender difference in age preference is not expressed in an automatic and rigid fashion. In Table 1 we have suggested some of the factors that would interact in determining such preferences.

An interesting direction for future research would be an investigation of individual differences in age matching. What are the characteristics of those individuals who marry against the pattern (such as older women who seek or marry younger men)? What are the characteristics of those individuals who show an exaggerated preference (such as older men who seek or marry women several decades younger than themselves)? According to the framework in Table 1, for example, we would expect that individuals who have themselves withstood the aging process very well, or who have accumulated substantial resources, would be exposed to more alternatives. Such individuals would probably have received correspondingly positive feedback from the opposite sex. Conversely, individuals in whom the aging process has been accelerated because of deteriorated health have less to offer and would be expected to have less stringent demands in a mate. Thus, we would predict that males in their 30s who marry older females would be generally less attractive than their peers who marry women slightly younger, whereas women in their 40s who marry younger males might be expected to have more attractive features, and to show fewer signs of physical aging, than those who marry older males.

9.4.1. Constraints on males' preferences for youth. A consideration of the interaction between personal characteristics and environmental pressures might help address another question. Why are males above 50 not interested in even younger women than we found here? Older men's preferences often include women who are at an age past or nearly past childbearing years. How can this be said to be the result of an evolutionary history of maximizing reproduction? We have argued that reproductive success depends, in part, on direct contributions to reproduction. This should have the effect of attracting males to signs of remaining reproductive years in females. Another contri-

Table 1. *Examples of factors that could interact to affect age criteria in a mate.*

Individual's traits	Environment	Cognition
Sex	Sex ratio availability of opposite sex competitors of same sex	
Degree of Aging	Local age of maturity and peak fertility	Perceptions of self: perceived attractiveness perceived social status
Characteristics contributing to status and resource acquisition nonverbal dominance size social intelligence	Divorce rates	Perceptions of available alternatives
Other characteristics contributing to physical attractiveness facial symmetry muscle tone and coordination	Social norms rules specifying age of appropriate partners	Attention to and awareness of relevant norms
Hormonal factors	Existence of living offspring	Attention to competitors
	Infant mortality	Expected length of particular relationship
	Resource availability	
	Present attachments	

Note: The influence of any single factor is presumed to depend on the level of other factors. Such environmental factors as social norms or available partners will not have an effect unless they are attended to. Individuals' self-perceptions of attractiveness will depend in part on their actual physical condition and appearance, as well as on feedback from the social environment (which will in turn vary with sex ratio). The list here is not meant to be exhaustive, but simply to provide a rough outline for considering the complex interactions that could influence age criteria.

bution to reproductive success is indirect, however, through parental investment. This may be improved by finding partners who are relatively similar to us, and with whom we can more easily bond. There is no reason to expect that older males will stop looking for mates, or will stop using the heuristic "look for a relatively younger woman." But as a male ages, his reproductive success may be increasingly influenced by his ability to support his existing children and grandchildren. A woman who is relatively younger, but similar enough to stay bonded with him, is in a better position to provide motherly or grandmotherly care for him and his existing progeny. He himself will be likely to survive longer (and thus contribute more to existing children and grandchildren) if he has a partner (Cohen & Wills 1985; House et al. 1982). From an evolutionary perspective, the older male loses nothing by continuing with the previous heuristic to prefer relative youth, and he may continue to gain from a tendency to prefer similarity in a mate.

Two other environmental factors might act to buffer older males' interest in women substantially younger than themselves. First, they would have to compete with younger males who may be in better condition and who may also be more willing to engage in aggressive competitive strategies. In an interesting analysis of homicide data, Daly and Wilson (1988b) have demonstrated that males in their late teens and early 20s are most likely to engage in fatal competition with other males. They also found that sexual jealousy was a common cause of homicides among males. Such potential dangers may exert an inhibiting influence on an established man in his 50s or 60s. Men's perceptions of women's preferences may exert another inhibiting influence. Most men in their 60s are simply not in a position to demand women who are several decades younger. According to the reasoning above, women in their 20s and 30s want a man who is not much more than 10 years older, because that optimizes resources and matches the male's remaining years of life to the female's remaining years of child-care. A man 30 years older simply would not be in a position to provide care for the woman during the period when he will be most needed. Also, a man's economic resources may peak during his 40s, and begin to reverse after the mid-50s (Jencks et al. 1979). Because younger women are at their peak reproductive value, they are in a position to demand men only a bit older than themselves.

To summarize this section, a number of interesting questions are raised by a consideration of interactions of organismic, ecological, and cognitive factors that might influence age preference in mates.

9.5. Psychological mechanisms

We have just discussed the possibility that cognitive factors might interact with an evolved age preference mechanism. The mechanism itself must, in some sense, involve cognition. To make age discriminations, an individual must attend to and organize some combination of features in potential mates. Further research in this area might consider several questions about the perceptual mechanisms involved. For example, what are the relevant features for age judgments? Are those features analyzed at a conscious or a nonconscious level? In line with the above discussion, it seems reasonable that visual cues for apparent youth (such as skin texture, hair qualities, and muscle tone), rather than verbal statements about age, might provide the proximal stimulus to which older males respond. We suspect that age preferences are based more on nonconscious responses to proximal cues than on consciously calculated strategies. That is, we do not envision a male saying to himself: "I am interested in a young woman so that I can have more offspring." Just as people use the rules of grammar without necessarily having any ability to describe those rules, people probably respond to cues for attractiveness without any necessary awareness of the ultimate foundations for those preferences. For the same reason, we would assume that men who have had vasectomies would show the same general pattern of attraction as other men.

Although we do not see conscious cognitive factors as necessary to explaining the effects we report here, we do believe, in line with the interactionist model we just discussed, that such factors could play a role under certain circumstances. For example, if an older man had the conscious desire to have children, he might be expected to value youth more highly than would a man who had a conscious desire to find a woman who would make a good grandmother for the children of his existing offspring. We would hypothesize that both men would still respond similarly to the proximal cues for attractiveness. The man interested in reproducing, however, would avoid opportunities to make attachments with any women who were not considerably younger and might pass up several dating opportunities that would lead the other man into a relationship.

Once relationships have been initiated, it seems likely that a different set of mechanisms begin to operate, and that proximal cues to youth and attractiveness become less important for both sexes. It is therefore important to distinguish mechanisms that affect initial attraction and those that affect the maintenance of a relationship. Numerous social psychological studies have indicated that the two processes are not synonymous (cf. Kenrick & Trost 1989). We suspect that proximal cues to a partner's age have the most impact on initial attraction. Once a bond is formed, however, partners probably pay less attention to one another's physical attractiveness. On the other hand, similarity might become relatively more important as relationships continue, particularly as it affects compatibility of values and preferred activities.

9.5.1. Experimental studies of proximal mechanisms. The present findings support a further liaison between social psychology and evolutionary biology. The controlled experimental techniques used to study other social psychological phenomena (e.g., Cosmides & Tooby 1989; Sadalla et al. 1987) could be used to examine the proximate mechanisms underlying these age preferences. Two recent experimental studies are relevant in this regard. Experimental research by Brewer and Lui (1989) indicates that subjects making social judgments seem to be preperceptually attentive to two features of target stimuli – age and gender. Other work by Langlois and Roggman (1990) has examined the mechanisms underlying physical attractiveness judgments. The latter research combines an evolutionary model with a cognitive prototype approach and finds evidence that attractive faces are those that are close to the population average. Results of such

studies suggest two things. First, experiments can help us understand the proximate mechanisms underlying evolved cognitive heuristics. Second, processing of age, gender, and attractiveness seems to be made at a preconscious level.

Experimental research that independently varied verbal information about chronological age and apparent youthfulness of potential partners would be useful. Such research could address whether cues associated with apparent youthfulness in a female may be more important than cognitive information about her age. In line with Symons's (1989) arguments in this regard, and with the above discussion of interactions, we suspect that physical appearance (which provides some indication of reproductive condition) is probably more important than chronological age. There are a number of competing predictions that might be made about the particular attraction mechanism that works overall, or which mechanism applies in which social situations. Symons's (1989) reasoning suggests that a possible sexual attraction mechanism in males might take the form: "Look for a woman who is sexually mature, but has not yet borne offspring." Given the evidence that people quickly process information about age and attractiveness, such a cognitive mechanism seems plausible. This line of reasoning suggests other empirical questions. Are people's judgments of a woman's attractiveness influenced by whether she has borne offspring? If so, what are the proximate cues that allow such differentiations? How good are men at distinguishing women who are sexually mature from those who are not, and how are different proximate cues weighted in making such decisions? How good are men at distinguishing women who are postmenopausal, and again, what are the proximate cues?

9.6. Implications of gender differences in age preference

We noted earlier that the differential patterns of male and female preferences demonstrated a failure of matching for the two sexes. The graphs depicting male and female marriage and preference patterns seem to suggest a related logical inconsistency. How can it be that females' marriage ages match their *unvarying* preferences across the life span, whereas male's marriage ages match their *varying* age preferences? The answer is that the ratios of each sex marrying change across the decades. Among teenagers who get married, females outnumber males by a considerable margin. The members come closer during the 20s, and then begin to reverse themselves after the 30s. Figure 12 depicts the changing age ratios for the Seattle marriage sample.

A similar pattern appeared across all the marriage samples. For example, on Poro between 1913 and 1939, 384 teenage males married, compared to 928 teenage females. On the other hand, there were 66 marriages involving men over 40, but only 30 marriages for women over 40. Thus, these data help explain the commonly noted discrepancy in remarriage rates in older men and women; they also suggest that the phenomenon is not simply a function of higher mortality in males. Other researchers have noted that divorce and remarriage patterns in older males fit with a fitness-maximizing strategy (Lockard & Adams 1981; Mackey 1980). This tendency no doubt relates to lower remarriage rates among older women.

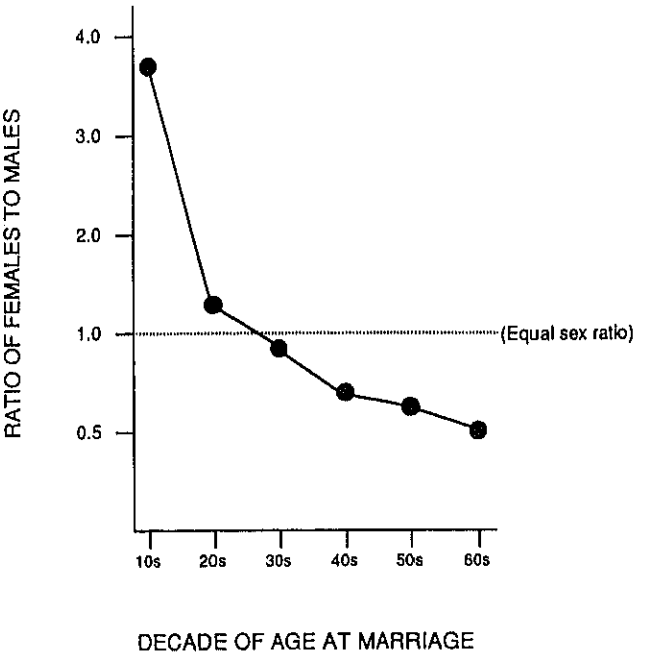

Figure 12. Sex ratios in marriage across decades (calculated as number of females/males getting married at a particular age range). Note: The Y axis is arranged so that a 2:1 male ratio and a 2:1 female ratio are equidistant from the line representing an equal sex ratio.

Table 2 shows that discrepancies in age ratios are not limited to our samples but are found in diverse geographic locations. The table also demonstrates how the unbalanced marriage ratio for older females is mirrored by an early marriage ratio unfavorable to younger males.

The data from Table 2 are taken from Table 24 of the United Nations Demographic Yearbook (1989). Examination of similar statistics compiled there for other nations reveals that the age-linked gender difference in marriage ratio appears worldwide. It is interesting to note, however, that when UN demographers computed marriage *rates* for each sex (in Table 25, following the one from

Table 2. *Number of men/women marrying at ages below 20, and above 50, in diverse geographic regions (men are listed first in each column).*

	Age of marriage			
Region:	*Under 20*		*Over 50*	
Mauritius (Africa)	49/1227	(.04)	559/188	(.75)
Cuba (N. America)	4685/20,957	(.18)	3962/1584	(.71)
Singapore (Asia)	457/4,304	(.10)	240/62	(.80)
Malta (Europe)	93/484	(.16)	66/21	(.76)
Fiji (Oceania)	538/1952	(.22)	123/46	(.73)

Note: Data are from the year 1975, as reported in the 1987 Demographic Yearook (United Nations 1989). We did not look at the numbers before choosing a location, but simply included places designed to be as geographically separate as possible, with the only limitation being that marriages for 1975 were reported by the United Nations.

which the figures above were calculated) they nevertheless based that rate on the number of marriageable opposite sex individuals "in the same age group" (p. 133). It would appear that, with the possible exception of people in their 20s, this practice is misguided for most age groups. The data we have presented indicate clearly that, across sexes, the pool of marriageable partners is not constituted by those of the same age.

In a related vein, Townsend (1989) found that, as women's status increased, they indicated a preference for men with progressively higher incomes. Men did not show a similar tendency; high status men still included women with relatively lower incomes in their preferences. Townsend noted that this results in a sex-differentiated narrowing of the pool of eligible partners. With increasing status, men have an expanded pool, whereas women have a more limited pool. There is a parallel in our findings; increasing age results in a differential shrinking of the pool of possible partners for women.

10. Conclusion

The findings reported here support the heuristic value of a consideration of reproductive value and fertility in making predictions about heterosexual attraction processes; they also reinforce the value of integrating social psychological and evolutionary approaches to mating behavior (Buss 1989; Cunningham 1981; Kenrick & Trost 1989; Symons 1989). As evolutionary theorists increasingly emphasize facultative interactions, varying life history strategies, and psychological mechanisms, it should become clearer that an evolutionary approach is not incompatible with the approaches typically taken by psychologists (Crawford & Anderson 1989; Symons 1989).

As we have indicated in the above discussion, our model raises a number of interesting empirical questions:

1. What are the cultural and ecological factors that might interact with age preferences? The questions about variations in sex ratios are particularly interesting.

2. What accounts for individual differences in mate choices? In addition to the questions raised earlier, it might be of some interest to examine homosexual age preferences. Homosexual preferences raise several interpretative problems, because it is uncertain whether to expect homosexuals to act in line with their own biological sex, or with the sex of the targets they are interested in. Homosexual choices could shed light on the sex ratio question, however. For example, older homosexual males do not face the same favorable sex ratio as do older heterosexual males, so from a simple sex ratio perspective, one might not expect them to show as strong a preference for relative youth.

3. What are the cognitive mechanisms that underlie the gender differences in age preference, and what other cognitive influences might moderate those preferences?

The findings presented in this paper also stimulate additional questions about differential life histories: Is the age of menopause related to the existence of surviving children and offspring? Is a woman's attractiveness diminished more by reproductive than by chronological age? How are bodily changes associated with reproduction (puberty, menarche, and menopause) related to ecological factors, like sex ratios or an individual's position in the local status hierarchy? Nyborg and Boeggild (1989) present the interesting suggestion that many gender differences in behavior, although rooted in the evolutionary past, are influenced at the proximal level by hormones like testosterone. Although we have focused mainly on psychological mechanisms, it might be possible to derive interesting hypotheses about how hormonal variations across the lifespan are linked to variations in mate preference. Thus, a consideration of life history strategies raises questions that connect developmental psychology, social psychology, psychobiology, and evolutionary biology.

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NOTES

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2. We are not aware of any mammalian species in which a reversal occurs such that females are more dominant and subject to selection by males for that reason. Ralls (1976) reviewed the instances in which female mammals are larger than males, and concluded that there was no evidence of a reversed sexual selection process at work. For instance, females in these species did not tend to be especially dominant or to compete for high investing males. However, such a reversal sometimes occurs in other species (e.g., some fish and insects). Such reversals occur when the male investment in the offspring is larger and they fit with the general parental investment theory discussed below.

3. We thank Prof. Guus van Heck of the University of Tilburg for providing us with the Dutch data, and Ute Hoffman and Kirstin Schaefer of the University of Bielefeldt for providing the German data.

4. We thank Dr. Nenita Estrera and Nieves Estrera for gathering the Poro data.

5. One could argue that both groups in this study might have been relatively high in resources, but a comparison of either of these patterns with those of any of the other studies reveals the same pattern of sex differences. Comparisons across the different studies are discussed further below.

6. One reviewer of a previous draft of this paper suggested that perhaps the norms are more complex, and that young males are subject to normative pressures to seek older females, whereas older males are subject to normative pressures to seek younger females. This explanation is interesting, but it raises a couple of questions. First, if such norms exist, why do the normative theorists we cited not seem to be aware of them (failing to even mention such variations)? Norms, after all, are shared rules or social conventions. Second, why do the same age-related changes operate across widely different cultures? Normative explanations are not useful unless one can demonstrate different cultures or subcultures that show variation in behavior consistent with variations in norms.

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Perceived age, physical attractiveness and sex differences in preferred mates' ages

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Kenrick & Keefe (K & K) present a strong case for considering the sex difference in the ages of preferred mates as an evolutionary result of divergent reproductive strategies. Their evolutionary framework is admirably broad, leads to interesting questions that can be addressed by empirical studies, and is well supported by the empirical data presented with it. Their fine-tuned sociobiological model of age preferences is sufficiently precise to allow it to be tested (successfully) against alternative social exchange models, yet it is sufficiently open to environmental influences to incorporate at least the majority of relevant findings in social psychology. Finding little to dispute in their target article, this commentary is devoted to a few points that supplement their account.

The importance of perceived age. K & K (sect. 9.5) raise the issue of the psychological mechanism underlying age preference. As they note, within a sociobiological framework *perceived* age, not chronological or even biological age, is likely to be the key variable. The reasons for this, however, are not well elucidated in their target article. The following considerations might be added to their suggestion that "nonconscious responses to proximal cues" are more likely to be involved than are "consciously calculated strategies" such as inquiring about chronological age.

First, there are numerous changes in physical appearance that we can readily detect in principle and that would allow us to judge the maturational status of others. Existing research reveals that we are quite sensitive to some of these changes and that they do permit us to make judgments of relative age (e.g., Alley 1983; Todd et al. 1980).

Second, chronological age is a poor index of biological age; most often, perceived age will provide a better indication of maturational status. Visually, for instance, we can easily detect the presence of secondary sexual characteristics marking the attainment of sexual maturity. Visual information for assessing biological age may be present even when we are not able to use physical appearance to judge chronological age accurately (Alley 1988).

Third, people can easily lie about their chronological age whereas their (approximate) biological age will usually be clearly evident in the morphological and surface qualities of their bodies. Although people do attempt to deceive others about their age by using cosmetics, wigs, and other devices to alter their physical appearance, it seems likely that their success is heavily dependent on products and techniques not available in our environment of evolutionary adaptedness.

Fourth, it seems likely that accurate records, including memories, of chronological age would seldom be available in our environment of evolutionary adaptedness.

Gender, attractiveness and aging. Human females are more paedomorphic (i.e., retain more infant-like physical characteristics as adults) than males (Gould 1977), making a more youthful appearance also more feminine. Consequently, youthful characteristics may act as signals for femininity whereas mature features may signal masculinity. Hence, part of the reason males tend to prefer women with a relatively youthful physical appearance, and vice versa, may be that these age preferences are directly tied to the preference for opposite sex mates. Just as men's wide shoulders, women's breasts, and other secondary sexual characteristics may function as heterosexual attractors or "sexual releasers" (Eibl-Eibesfeldt 1989; Horvath 1979), so too might age-related physical characteristics. In other words, the sex difference in the ages of preferred mates may also reflect our attraction to potential mates with sex-typical, or even supranormal, physical traits (Alley 1988).

K & K cite the recent study of Langlois and Roggman (1990) as an example of an experimental study elucidating the "proximate mechanisms" that might underlie age preferences. In arguing that attractive faces are only average, however, the model advocated by Langlois and Roggman provides no clear role for age-related changes in appearance. In fact, their perspective appears incompatible with K & K's. If aging effects were simply incorporated into the averaging process, the most attractive faces should have characteristics typical of an average age person, whatever that might be. This mechanism would not make youthful women more physically attractive, as the evolutionary theories of K & K, Symons (1979), and others suggest. Langlois and Roggman note, however, that "other elements may also be important in influencing judgments of attractiveness" (1990, p. 120). Using a sociobiological perspective as in the target article, Alley and Cunningham (1991) have argued that adaptive mate selection probably requires preferences for some *a*typical physical characteristics, including a preference by males for youthful female facial characteristics.

In addition to the two studies mentioned by K & K (sect. 1.2.2), other studies have found evidence that female faces with infantile or youthful characteristics are particularly attractive (Alley 1988; Berry & Zebrowitz-McArthur 1988; Fauss 1988). There is also more evidence than is presented by K & K to support the related point that aging has a detrimental effect on the physical attractiveness of women (reviewed in Alley 1988). Moreover, it appears that this detrimental effect of aging may not apply in late childhood and adolescence when the peak of reproductive fitness has not yet been reached (Alley 1988). If so, this would confirm another (implicit) prediction of K & K's model, namely, that females' physical attractiveness to adult men should not simply decline with age, but should instead change with age in a manner corresponding to their perceived age relative to the age of maximum reproductive value.

On the separation of reproduction from mating preferences

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Contrary to the recent move toward a view of human arrangements as social and historical constructions (Gergen 1991; Scarr 1985), Kenrick & Keefe (K & K) seek to ground male and female mating preferences in the transhistorical and fixed laws of reproduction. Through a conceptual twinning of sex and economics with reproduction and production, and extensive reference to cross-cultural and cross-generational data, K & K explain male and female mating preferences in terms of a functional exchange in the sexual market for reproductive gains. Their data, however, serve a dual purpose. Not only are they interpreted as supporting a sociobiological structure that determines mating preferences, but they are also used by K & K to substantiate their claim that evolutionary theory can parsimoniously subsume social psychology's unsystematized find-

ings on mate preferences. As the tenability of either of these claims hinges on reproduction, or "reproductive strategies," it is doubly important to ask about the curious absence of any data on reproduction.

Stating from the outset that "differential reproductive success is, after all, at the heart of natural selection," K & K place reproduction at the center of their work on mating preferences. The failure to report data concerning reproduction (e.g., number, survival, and care of offspring), although not peculiar to K & K's research (see Gladue 1989), is a critical omission in the light of their hypotheses, empirical assertions, and theoretical claims. Without data on reproduction, "reproduction" must function in some symbolic way in this empirical test of mating preferences.

Reproduction functions as "the (marked) board" on which the political contest between evolutionary and social theory is played (Haraway 1990, p. 147). That is, reproduction when seen as a "natural" imperative turns mating preferences into "natural" selections, productive and reproductive of a "natural" social order. "Strategy," in line with its etymological origins in military cleverness, connotes for K & K staying in the reproductive game. That is, seeking a mate (social exchange) with whom to reproduce (evolutionary intent). Absent from K & K's empirical account, as either subject or object of mating preferences, is the reproductive behavior of having and raising babies. Whether distinguished as somatic or reproductive *effort*, or as reproductive potential or behavior, K & K provide no measures of any of their various definitions of reproduction. If the stakes in this game are not progeny (i.e., reproduction), might they have more to do with the dominance of one explanatory model, evolution – over another, social?

Criticisms of Darwin have illuminated his projection onto nature of Malthusian economics and the workings of Victorian society (Bleier 1984; Hubbard 1983). K & K do what other proponents of evolutionary thought have done before. They reflect back onto human behavior this early socially constructed view of nature as nature being in and of itself a driving force of a particular social order (Sayers 1982). They draw a fairly direct comparison between contemporary social arrangements and past nomadic hunter-gatherer ways of living wherein women "provided the bulk of child care and . . . substantial calories to the diet" while men "hunted and provided crucial protein." When they depict women as everyone's mother (e.g., offspring of their own marriage, men's "existing progeny," grandchildren, or men themselves) and men as predominantly providers and protectors, K & K recapitulate the social and historical sexual division of labor as biologically and functionally determined. This is but a partial view, however, a particular cultural story of women as nurturers and men as providers (see Janson-Smith 1980).

According to K & K, women exchange attractiveness and men wealth and status to consummate this reproductive bargain. Women's commodities are located in their bodies and men's in the public world; women's commodities are determined by "nature" and therefore held passively and without volition, men's by "culture" and therefore held actively and with volition; women's reproductive fertility is limited, men's unlimited. In this market, women's soft currency of physical attributes wanes over time while men's hard currency of wealth generally waxes. Even women with wealth and status are shown to be no exception to nature's rule of exchange (see K & K's Figure 9). Reproduction is used in this scenario to render natural both the commodities of exchange in female and male mating and the cultural drama of dominance and competition amongst males for the resource of female fertility (see Gross & Averill 1983; Morawski & Steele 1991).

K & K further equate male attractiveness with dominance, *manifest* in wealth and status, and female attractiveness with youth, *representative* of fertility. Judgments of attractiveness, although entertained as a psychological mechanism interacting with "an evolved age preference mechanism," are characterized as typically "nonconscious responses" to cues, except under particular conditions. K & K speculate that even men who have had vasectomies will show a preference for young, attractive, fertile females, despite their conscious nonintention to reproduce. Elsewhere they characterize the exchange process of "biological fitness and reproductive value" as "reflect[ing] evolved adaptations that may operate below the level of consciousness." One interpretation of K & K's use of conscious and unconscious processes is that it is a device that enables theorists to position themselves in particular ways *vis-à-vis* others' behavior to yield knowledge that others do not have (for additional examples of this in gender research, see Morawski 1985). If these processes of attraction and exchange are unconscious, then what is conscious? And who has it? For example, what is reproductive responsibility, and who will assume it? Or is this also calculated outside of consciousness?

Without information about reproduction, K & K's evolutionary meshwork of mating preferences and reproductive strategies falters, as does their claim of its parsimonious explanatory power over social psychology, despite the historical reliance of both social and evolutionary discourses on the social exchange metaphor of a political economy of nature (Gergen 1990). Even when the findings of K & K are considered as mating preference data alone, they are not without problems. Personal ads selected for their information on sex, age, and wealth are representative of persons for whom this information is salient. Cross-cultural data without reference to the positions of men and women in those societies or to the number of times they marry tell us little about their social arrangements of marriage. A framework of competition and dominance in the social exchange of mating preferences ignores alternative accounts that do not assume that dominance is rooted in nature (e.g., Haraway 1991), as well as those that go beyond a "minimax" strategy of intimate relations (Gergen 1990). What some of K & K's findings do suggest, however, is that our preferences are often more extreme than our choices for marriage (see Figure 10), that social change is indeed a slow process (e.g., compare Figures 3 and 4; Figure 11), and that males stay in the mating game longer than females (see, for example, Figures 7 and 9 in which data for women in their 50s and 60s is absent).

In the end, we might well ask what substantive information on reproduction would add to K & K's essay. Is it possible that once teenage pregnancies, single, female-headed families, and the instability of fertility, along with the use of birth control and reproductive technologies, (see Sandelowski 1990) are taken into account, "natural" reproductive strategies will appear as merely part of the variance rather than the main effect? Where do technological innovations in reproduction figure in these invisible equations of evolutionary psychology? And, finally, will these reproductive practices not speak to our intimate relations as the social construction of particular historical moments?

Age preferences: The crucial studies have yet to be done

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Kenrick & Keefe (K & K) report new and highly interesting data on the cross-cultural generality of sex-specific age preferences in mates, arguing convincingly that their findings reflect sex differences in reproductive strategies. So far, I perfectly agree with them, but for two reasons, I cannot share their view that these findings suggest an evolutionary explanation of mate selection

criteria more than social-psychological economic exchange models: (a) Evolutionary and social-psychological models explain social phenomena at different levels, and (b) reproductive capacity may itself be a resource that is desired by the opposite sex. Points (a) and (b) are discussed in turn.

Evolutionary models intend to explain current biological and behavioral phenomena in terms of how these phenomena might have increased the organisms' inclusive fitness in the species' evolutionary past. Among humans, the preference of older males for younger females is easily explained this way, whereas the preference for mates of a similar age is less easily explained. But this does not at all affect the raison d'être of social-psychological models, which is to provide an account of the psychological processes underlying current mate selection, for instance, the feelings of males and females toward younger and older members of the opposite sex, what males and females do to attract members of the opposite sex, and how sexual arousal affects mating behavior. The importance of both the evolutionary and the psychological perspectives has become very clear in recent years concerning the phenomenon of *altruism*. Whereas evolutionary models are useful for explaining why humans help mainly relatives (Hamilton 1964) and people they trust (Trivers 1971), only psychological approaches are useful to clarify whether benefactors intend to improve their own psychological condition or the condition of the recipient (Batson 1987). [See also Caporael et al.: "Selfishness Examined" *BBS* 12(4) 1989.]

Admittedly, the authors of the target article write that evolutionary biology and social psychology should cooperate in research on mate selection. But at other places they argue that evolutionary models account for the data better than social-psychological models: "When age preferences from mating advertisements are examined more carefully, they yield results that were not predicted by social economic models. . . . The results do fit well with an evolutionary model." In my view, such a debate is counterproductive. Obviously, many social psychologists completely ignore the biological roots of human behavior and therefore suggest unreasonable models that should be replaced by more appropriate social-psychological ones. But social-psychological models will never be successfully replaced by evolutionary models, just as biochemical models of the human immune system will never be successfully replaced by evolutionary models. Science needs many levels of analysis.

My second point is that the target article distinguishes insufficiently between evidence for reproductive strategies and evidence for evolutionary models. Given that many couples who marry consciously intend to have children, the reproductive potential of a prospective spouse should be a highly desirable commodity. Moreover, because most women cannot give birth to children after their 40s, older males who marry and want children have to look for younger females. This applies to all cultures and generations. Thus K & K's findings are easily explained by economic exchange models that include reproductive capacity as a desired commodity. (That most people intend to reproduce may nevertheless be explained by evolutionary models.) Such an exchange model may predict that the preference among older males for younger females is substantially affected by their subjective intention to reproduce. To my knowledge, this has not yet been investigated.

Evolutionary models, however, assume that the preference of older males for younger females has a genetic basis and evolved because genes that augmented this preference spread in the population. This view is very reasonable and implies stronger predictions than an economic exchange model. Evolutionary models predict that males' preference for younger females should be quite unaffected by their subjective intention to reproduce. Moreover, because there are individual differences in the preferred age difference of a spouse, behavior-genetic methods, such as twin and adoption studies, should be applied. Evolutionary models predict that, within twin pairs, age differences of monozygotic twins and their spouses should be more similar than age differences of dizygotic twins and their spouses. [See also Plomin & Daniels "Why Are Children in the Same Family So Different From One Another?" *BBS* 10(1) 1987.]

Although I share K & K's view that evolutionary models of age preferences in mates are reasonable and worthy of being tested, I believe that the crucial studies have still to be done. The reported cross-cultural universals in mating patterns may also be explained by economic exchange models that consider the universal biological differences in the reproductive capacity of males and females. And K & K also report differences among cultures and generations! Whereas males in their 60s married women who were 20 years younger than themselves on the island of Poro (Figure 8), males in their 60s who married in Phoenix in 1923 had wives 15 years younger than themselves (Figure 4), and males of the same age who married in the same city in 1986 had wives about 10 years younger than themselves (Figure 3). Thus there are cultural and cohort effects.

So what we need are data that distinguish more clearly between different reasonable models, evolutionary models that do not deny cultural factors, and social-psychological models that consider biological factors. What we don't need is a debate about whether evolutionary models or poor social-psychological models are superior. Obviously, many of my statements can also be found in the target article. But when they contrast the evolutionary and social-psychological models, Kenrick & Keefe seem to be defeating their major purpose, which is to fully integrate the two approaches.

The May-September algorithm meets the 20th century actuarial table

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Are men attracted to younger women, as the social psychologists suggest? Or are male preferences complicated by the additional preference for similarity of spouse, as Kenrick & Keefe (K & K) propose in this target article? I wish to demonstrate that the social psychological prediction is consistent with the data, although K & K are right that the basis for the preference is rooted in selection pressures and not in arbitrary cultural norms.

K & K rest their case on findings suggesting that differences in age between men and preferred or actual mates are not consistent across the male lifespan. Does this observation in fact undermine the social psychological prediction or support the argument that men select not only for age of mate but also for similarity? Let me focus initially on the finding that young men usually do not prefer or marry women who are younger than themselves and sometimes even marry slightly older women, as this is one of the trends seen by the authors as causing trouble for the social psychologists. The trend is certainly not surprising, and indeed what else could we expect? One assumes that what we are witnessing here is a floor effect; the fact that a man can set his sights only so low when it comes to yearnings after a young wife. Any lower runs into barriers of cultural norms and, more to the point, of biology. In addition, my own cross-cultural data (based on codes from Palfrey House, unpublished) suggest that, in societies where the age of consent for females is younger than is the typical marrying age for males, marriages between young men and slightly older women disappear and, indeed, young men tend to marry slightly younger women. Thus, on a worldwide sample of 26 subsistence economy societies in which men commonly marry at 19 years of age or younger, wives are an average of 2.44 years younger than their husbands. This trend is discrepant with the K & K data for Western samples but more consistent with their own findings on more traditional cultures. The cross-cultural data suggest that even the youngest men

marry women younger than themselves when this is culturally possible. Common sense and worldwide trends, then, suggest that the smaller difference in age of men and their preferred mate choices when men are in the youngest marriageable age bracket is not a result of any psychological mechanism requiring a new and more elaborate theory. Rather, at the lower end of the age scale, the possibilities for acquiring a younger wife are going to bottom out.

What about the trends in preferred mate choice for older men? My own data indicate that on a sample of 16 nonwestern cultures where men most commonly marry in their 20s, the husband is on average four years older than his wife, whereas in the five traditional cultures in my sample where men marry most commonly in their 30s, wives are on average 11.9 years younger than their spouses. These findings parallel the K & K observations within this age range, so that the older the man the more pronounced the age difference between spouses. Note, however, that we can now invoke a single explanation to account for the preferences of the younger men as well as these older males. Thus, it seems that across the age range from the teens through the 30s, men prefer a younger woman. This is consistent with Symons' (1980) predictions from evolutionary theory, cited by K & K, that men should choose women between 17–22 years of age, plus or minus 2, if they are evaluating women as wives. K & K believe that these trends are inconsistent with the social psychological claims, citing as their reason that "the preference for younger females is weak or nonexistent during early years" for men. This begins to look like a semantic confusion. K & K appear to be interpreting "younger" to mean "younger than the man" whereas, in fact, both the social psychological and the sociobiological positions mean "younger" to refer to "younger than other women." If we go with the second, correct definition of "younger," then both the findings reported in the target article and the expanded cross-cultural data presented here are entirely consistent with the social psychological position.

The second trend in their data that induces K & K to elaborate the mate choice story beyond the simple social psychological version has to do with the tendency of men past 50 to choose mates who are still younger than they are but who are not very young. To account for these findings, the authors propose that we have the effects here of a desire for similarity of mate counterbalancing the effects of the desire for a younger woman. Similarity of spouses is then seen as a way to consolidate bonds between spouses, facilitating pair-bonding and biparental care. I have a number of problems with this claim. The first has to do with the notion that close bonds between spouses are actually necessary for the kind of care of offspring that human young require. I have rated a worldwide sample of 94 cultures on the degree of intimacy demonstrated between spouses as measured by the extent to which couples spend time and engage in shared activities together (Broude 1987). Fifty-seven societies were characterized as relatively intimate and 37 as relatively aloof. This already suggests that strong pair-bonding is by no means universal in human marriages. Perhaps more interesting in the present context, marital aloofness occurs predominantly in communities with some shared identity, particularly common kin ties, shared political or religious affiliation, equivalent social or economic status, and the like. This suggests that spouses tend to forge strong pair-bonds only when the wider community offers no concrete source of support. Most telling for the K & K hypothesis, it is generally assumed that living arrangements in our ancestral hunter-gatherer communities were kin-centered and homogeneous, that is, the kind of context with which aloof marriages are associated. So it is unlikely that mechanisms inclining people to form close pair-bonds were selected for in the environment in which we evolved.

The notion that we choose spouses similar to us is bothersome to me for other reasons when we locate the claim within an evolutionary framework. [See also Rushton: "Genetic Similarity" *BBS* 12(3) 1989.] How similar should spouses be? With respect to what? Natural selection theory predicts that spouses should not be too dissimilar; at the outer limits a couple would risk failure in producing viable offspring. At the other extreme, spouses should not be too similar, as this would risk inbreeding. But between these two extremes we have a lot of room to work with, and there is no spelling out of details in the target article regarding degree of similarity. Along similar lines, with regard to what traits should spouses be similar? A virtual overlap of traits would mean that spouses were redundant, an inferior plan from an evolutionary perspective. Indeed, a degree of dissimilarity between spouses would probably better serve the inclusive fitness of the interested parties. I am also unclear as to why age similarity is relevant to the particular traits on which the social psychological literature says that couples in our society do match. Are religious and political affiliations and so on predicted by age? Finally, does what still represents a difference of 15–20 years between spouses really signify similarity? Is the 30–35-year-old woman really on the same wavelength as the 50-year-old man?

Why, then, would you get a decrease in disparity of age between spouses once a male reaches 50 years of age? Again, the trend needs to be located within the environment in which we evolved. What we wish to ask is what kind of Darwinian algorithm (Cosmides & Tooby 1989) would we expect the hunter-gatherer male to exploit in choosing a mate? The algorithm that best fits the sociobiological predictions is the one that advises a man to pick a wife as young as he can get her, consistent with reproductive maturity. One assumes, however, that the hunter-gatherer male had no strong cause to look forward to a long life and peaceful retirement in old age, so the algorithm can only be expected to work well within the average lifespan of the hunter-gatherer. The data for males below 50 years of age are consistent with the proposed algorithm. And although we have no actuarial tables for our remote male ancestors, an average life expectancy of 50 years or less is likely. In short, the algorithm is not predicted to work flawlessly beyond the May-September pairing, and this is reflected in the age difference patterns for older men. Even if selective pressures were eventually able to iron out the wrinkles in the algorithm as it applies to older men, there has not been sufficient time on the evolutionary time scale for this to happen. But we may also be running into another problem that is pervasive in the natural world. Interests conflict. As K & K point out, once you are 50 or older, you are more likely to lose in the competition with younger but established males in the bid for very young women. We don't always get what is likely to net us the best fitness advantage; rather, we do the best we can.

So what shall we conclude? The social psychologists, I think, are right in their parsimonious prediction. Where they make their mistake is in their explanation of why men prefer younger women, and women older men. The preferences are grounded, not in arbitrary cultural values, but in evolutionary imperatives. Kenrick & Keefe see this, and take this as evidence of the attractiveness of cross-fertilization of disciplines in research interested in examining behavioral phenomena. My own reading of the data diverges with the interpretations offered by the authors, but I take their study to demonstrate that cross-disciplinary research does pay off in its capacity to offer more satisfying explanations for a body of data.

Differential age preferences: The need to test evolutionary versus alternative conceptualizations

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An all-encompassing theoretical explanation of human behavior provides a potentially satisfying intellectual experience, especially when a specific exemplar is lucidly explicated and then buttressed by empirical data as in Kenrick & Keefe's (K & K's) target article. An inclusive framework is an impressive accomplishment whether it is based on theology, economic determinism, psychoanalytic concepts, conditioning, or reproductive strategies. Before all behavioral scientists leap aboard the evolutionary, sociobiological bandwagon, however, it might be useful to consider four cautionary points (Kelley & Byrne 1992). Initially, however, note that despite the emphasis on age as an exception to the similarity effect, U.S. Bureau of the Census (1981) data indicate that the typical American bride and groom are of approximately the same age, having birth dates within 24 months of one another.

(1) Explanation is not a satisfactory substitute for prediction. All too often it appears that the application of evolutionary principles to human behavior explains everything and predicts nothing. Consider for a moment a scenario in which mythical investigators were able to document the opposite mating relationships – that is, women prefer younger men while males prefer somewhat older females. Could differential "reproductive strategies" account for such a pattern? It seems easy enough to conjecture that in the history of our species, young males would have been highly suitable mates because they produce more viable sperm with fewer cumulative physical defects than do aging males (Blakeslee 1991; Harman 1991) and because they possess the strength and vigor best able to protect a mate from predators. As a result, a preference for such men would be a successful reproductive strategy for women. In contrast, males would encounter sexual and reproductive success with older, sexually experienced females because they would be more receptive to coital advances than would their younger counterparts and more likely to be demonstrably fertile in having produced previous offspring. The more general point is simply that a series of loosely assembled principles can be stretched and bent to accommodate almost any empirical finding. In the words of an old Jewish saying, "*For instance* isn't proof."

In addition, the argument that female fertility comes to an end is not an especially cogent evolutionary factor because of the limited life expectancies during the early millennia of human existence. It is easy to generalize from today's experience with an aging population living into their 70s, 80s, and beyond while overlooking the fact that in the United States as recently as 1900, the mean expectancy was just under age 50. If we examine data for time periods more relevant to an argument based on genetic selection (Paleolithic, Mesolithic, and Neolithic), we find life expectancies at birth ranging from 19.9 years of age to 31.4 (Swedlund & Armelagos 1976). Thus, it seems improbable that the climacteric was a major issue in the brief reproductive lives of the earliest women and men.

(2) Additional difficulties arise with anomalies. There are numerous well-publicized instances of older women who attract and are attracted to younger men (e.g., Mary Tyler Moore, Debra Winger, Olivia Newton-John, and Cher). Do these couples represent mutant individuals who were fortunate enough to discover one another? Societal changes in such patterns create an especially vexing dilemma because sociobiological explanations are most convincing when they support and justify the status quo (Gould 1981). When, for example, we learn from the National Center for Health Statistics that the number of pairings between older women and younger men in the United States increased from 16% of all marriages in 1970 to 22% in the 1980s (Toufexis 1987), must we conclude that a mutational epidemic is rapidly erasing the genetic wisdom based on maximally efficient reproductive strategies?

More parsimoniously, economic factors can be posited as the underlying explanation. That is, economically superior men in the K & K samples, economically superior women who are successful in show business, and increasingly independent women in a variety of occupations account for the findings reported in the article *and* for the anomalies. Those with sufficient economic resources are able to acquire the most desirable products, including mates.

(3) Other human preferences based on youth versus age are ignored, quite possibly because they are not easily explained by such concepts as reproductive strategy. Humans often favor that which is young or immature (e.g., baby veal, the newest audio technology, puppies). In other instances, the preference is for the aged and mature (e.g., some alcoholic beverages, vintage cars, antique furniture). Such examples, along with mate preferences, may be a matter of aesthetics, scarcity, culturally determined values, or actual superiority on specific dimensions.

(4) The usual bulwark of sociobiology – examples provided by other species – does not receive much direct attention in discussions of age preferences. Though K & K point out the role of dominance across species, it seems somewhat questionable to equate this with age, as professional athletes can testify. It seems to be an even more improbable conceptual leap from genetic selection based on prehistoric male strength and power to modern cues such as bank accounts, social status, and political clout; the omniscient genes responsible for females using these selection cues must be amazingly and speedily adaptive.

Nevertheless, there *are* animal data directly relevant to age preference in mating. Among chimpanzees, when mature males have a choice between two equally distant females with equally swollen genitals, they overwhelmingly select the *older* mating partner (Tutin 1979). Of equal relevance, old male rhesus monkeys do not demonstrate differential mating preferences for old versus young females (Chambers & Phoenix 1982). Also, Goodall (1986) notes that sexual popularity among various primates seems to be based more on social factors, personality, and behavioral style than on physical determinants.

These various comments are not intended to denigrate either K & K's data or their concept. Rather, the aim is to emphasize the importance of hypothesis testing that goes beyond the search for confirmatory evidence. It is here that sociobiology presents the greatest challenge to its adherents and to its critics. For example, if the same sex differences in age preferences reported in the target article were found in a culture in which women hold the economic and political power, this would provide strong support for their evolutionary theory of mate selection. Alternatively, if such a culture exhibited the opposite preference pattern, social exchange theory would seem a more likely explanation. In any event, K & K's emphasis on an interactive model and the importance of considering data from disparate domains deserves both praise and encouragement.

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Sex differences in age preferences for mates: Primary and secondary predictions from evolutionary theory

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Primary predictions from evolutionary theory are those that are made from a consideration of the ultimate causes that might have shaped a particular adaptation in an ancestral population. *Secondary predictions* from evolutionary theory are predictions about current behavior that require additional assumptions not necessarily derived from evolutionary theory. Valid tests of secondary predictions depend on the justification of these assumptions. I briefly describe primary and secondary predictions with reference to anorexic behavior and Kenrick & Keefe's (K & K's) theory of sex differences in age preferences in humans, arguing for the importance of identifying and justifying the assumptions required when secondary predictions are made.

Several authors (Crawford 1989; Surbey 1987; Voland & Voland 1989) have used Wassar & Barash's (1983) reproductive suppression model to make predictions about anorexic behavior. The basic hypothesis is that anorexic behavior is the result of an adaptation that evolved in ancestral populations for delaying reproduction by reducing body fat until environmental conditions or the ability to deal with them improved. We have focused on the role that female-female competition and inappropriate male attention might have played in the evolution of this putative adaptation (Anderson & Crawford 1988). A primary prediction from this hypothesis is that unusual levels of female-female competition and inappropriate male attention should be associated with dieting in adolescent women. Now if additional assumptions are made and justified a variety of secondary predictions can be made from this hypothesis.

At least two types of assumptions are involved in secondary predictions from evolutionary theory. First, assumptions about the relation between different evolved adaptations can be made, and then predictions based on these assumptions can be derived. For example, if we assume: (1) that social, emotional and intellectual skills required for successful reproduction are developmentally independent of the physiological maturation of the female reproductive system and (2) that a minimal level of social, emotional, and intellectual development is necessary for successful reproduction, it then follows that any environmental factor that produces early sexual maturity, such as a particularly rich diet, but that does not accelerate emotional and intellectual development, will increase the likelihood that the hypothesized stresses (i.e., female-female competition or inappropriate male attention) will activate the reproductive suppression mechanism and produce an interest in dieting. If our assumption about the relation between reproductive and emotional and intellectual development is valid we can predict that a level of stress from female-female competition or inappropriate male attention that would have little impact on dieting in a girl reaching puberty at a normal age would exacerbate dieting in early-maturing girls.

Second, we can make assumptions about the relation between the level of the environmental stresses in the ancestral environment that shaped the adaptation and the current level of those stresses and derive secondary predictions from them. For example, if we assume that current levels of female-female competition or inappropriate male attention are much higher than they were when the putative reproductive suppression mechanism evolved, we can make the secondary evolutionary prediction that dieting should be much more severe in current environments than in past ones.

The above assumptions allow us to make a variety of secondary evolutionary predictions about the causes of anorexic behavior in current environments. Valid tests of these predictions depend on a justification of the assumptions. How can we justify them? Information bearing on the assumption that emotional and intellectual development and physiological development of the reproductive system are independent could be obtained by determining whether the acceleration in the age of puberty that has occurred during the last centenary has been associated with an acceleration in the development of emotional and intellectual maturity. Data on possible changes in the level of female-female competition and inappropriate male attention that adolescent girls face is more difficult to obtain. It would require, among other things, a comparison of the demographic features, family structure, and institutional protections available to adolescent girls in current and ancestral populations.

Now let us assume, for the sake of the argument, that K & K have made valid predictions from evolutionary theory, and that their data support their predictions. That is, let us assume that (1) both sexes prefer mates who are similar, (2) males, as they age, prefer women that are increasingly younger than they are, and (3) females prefer males that have dominance, resources, and social status, are valid primary predictions from evolutionary theory. Now if we make additional assumptions we can derive secondary predictions. Probably the most interesting assumptions relate to the type of marriage system a society "imposes" and the demographic and economic characteristics of the population. The secondary predictions for an egalitarian society practicing lifetime monogamy, such as the Hutterites, and an economically competitive society practicing serial polygyny, for example, would be quite different.

Let us consider the latter society, the one where serial polygyny is practiced, in some detail. Because older men prefer younger women, and women prefer men with wealth and status, and because it takes men time to accrue wealth and status, there will be a tendency for older, wealthier men to divorce their wives and marry younger women. One result is that there will be a number of former wives of these high-status older men. Because of the "similarity preference" prediction, these women can be expected to be more intelligent, wealthier, and more socially dominant than the average woman. We might call them the *old, smart, and dominant*. Assuming a 50:50 sex ratio, a second consequence is that, because some successful men marry more than once, and when they do, they prefer to marry women that are considerably younger than they are, there will be a number of younger men without mates. Because most women are assumed to prefer wealthier, high-status males, these men will tend to be young, unintelligent, subordinate, physically unattractive, and poor. We might call them the *young, dumb, and ugly*.[1] The predicted numbers in these classes of individuals is a secondary prediction from evolutionary theory that is based on demographic, economic, and cultural features of the society. It is possible to imagine a society in which both numbers could be substantial.

There are those who argue that serial polygyny will lead to large numbers of younger men marrying older women. But how many "old, smart, and dominant' women will be attracted to "young, dumb, and ugly" men? Secondary evolutionary predictions might be made about some of the behaviors of both types of individuals. For example, one such prediction is that some "young, dumb, and ugly" men, who are excluded from the sexual marketplace, will become hostile toward women. This secondary prediction requires documenting the assumption that sexual frustration leads to hostility to the objects of the frustration. Another possible prediction is that some of the "old, smart, and dominant" women, who also fare poorly in the mating marketplace, will be attracted to lesbianism. This secondary prediction requires documenting the need for sexual expression in middle-aged women and its relation to companionship. Many other secondary evolutionary predictions can be made, but all of them depend on a variety of nonevolutionary

demographic, economic, and psychological assumptions. I believe that the future of sociobiology depends on our ability to make such assumptions and to justify them scientifically.

I believe that K & K have put forward good arguments for their predictions and have provided much interesting data in support of them. I find the arguments for the age differences more persuasive than those for the similarity prediction, however. There may not be an evolved adaptation mediating mate similarity. Mate similarity may be a secondary prediction derived from the assumption of adaptations for assessing status, health, energy level, and so forth that are important for both males and females. [See Rushton: "Genetic Similarity, Human Altruism, and Group Selection" *BBS* 12(3) 1989.] I hope that in their future work Kenrick & Keefe pay more attention to possible differences between ancestral and current environments and to how mechanisms that evolved to deal with ancestral environments function now. To do this they must focus on secondary predictions from evolutionary theory and the assumptions that underpin them. All researchers who wish to use evolutionary theory to make predictions about current behavior must do the same thing.

NOTE

1. I considered using the more politically correct phrase *young, subordinate, and poor*, which would parallel old, smart, and dominant. But there is a big difference in aggressiveness and socialization between males who are young, poor, and subordinate and those who are young, dumb, and ugly.

Continuing a long tradition

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Kenrick & Keefe (K & K) have provided a fine example of the heuristic value of an evolutionary approach to the study of human behavior. The value of this stance is that it enables one to ask questions and see relationships that might not have been addressed without such a perspective. The similarity of functional relationships between male and female age and preferred difference in mate age from target age, illustrated in K & K's numerous graphs, is truly impressive given the diverse nature of the data bases considered.

I assume that we are being given a complete catalogue of all data bases studied and not just those consistent with the hypothesis. The latter procedure would weaken the case substantially. Nevertheless, one must guard against the fallacy that a prediction made and confirmed validates the theory. It does not; other explanations are possible and must be considered. Such an endeavor does demonstrate the value of an evolutionary stance as a generator of interesting hypotheses for systematic investigation in humans.

I must quibble a bit with some points that are peripheral to the main argument but prominent because they constitute the introductory paragraph of the target article. As K & K point out, both McDougall and James used evolutionary theory in groping for an understanding of human heterosexual attraction. Both recognized and understood Darwin's theory of sexual selection. I think it is misleading to say that McDougall "replaced" James at Harvard, however. James turned over the reins of the Harvard psychological laboratory to Hugo Munsterberg on an interim basis in 1892 and on a permanent basis in 1897. He devoted most of his subsequent academic time to matters more philosophical. James resigned from Harvard in 1907, and Munsterberg died in 1916. McDougall, meanwhile, spent his early career in England and Europe and was not called to Harvard until after World War I, in 1920. He probably read James's *Principles of psychology* around 1894–1898 and was greatly influenced by the book (McDougall 1930). With such a time lag, one would not say that he "replaced" James.

K & K claim that the evolutionary perspective of James and McDougall (and, I would add, others) "was rejected by psychologists who entered the field after the 1920s." It is true that a smaller percentage of psychologists wrote directly on evolutionary theory than had done so during the pre-World-War-I period. One should not underemphasize the role of evolutionary theory during this period, however. Much work in animal psychology was strongly influenced by evolutionary theory.

Animal psychology during this period was dominated by the work of Hull and Tolman, both of whom entered the field before 1920, but who did their most influential work later. In their edited book, *Mechanisms of adaptive behavior* (sic), Amsel and Rashotte (1984) document the role of the evolutionary perspective in the work of Hull, the paradigmatic learning psychologist. They note that "Hull's preoccupation with the concepts of natural selection and adaptation are not generally recognized or understood by recent commentators on traditional learning theory, particularly the 'neo-Darwinians'" (p. 13). Tolman demonstrated a clear appreciation of evolutionary principles in much of his work, including his defense of instinct theory (Tolman 1922; 1932).

The evolutionary torch was carried in particular by a generation of comparative psychologists trained during the period in question (see Dewsbury 1984). To cite only a few examples: Warden's *The evolution of human behavior* (1932); Stone's (1943) address as president of the American Psychological Association; Beach's *Evolutionary changes in the physiological control of mating behavior in mammals* (1947); and Schneirla's *An evolutionary and developmental theory of biphasic processes underlying approach and withdrawal* (1959). Contributors to Roe & Simpson's *Behavior and evolution* (1958) included Beach, Sperry, Pribram, Nissen, Carpenter, Harlow, and Thompson.

Contemporary approaches to the evolution of behavior differ greatly from earlier ones in many important respects. Authors such as Kenrick & Keefe are continuing a long tradition, however, not breaking with one.

Arbitrariness and bias in evolutionary speculation

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The main substance of Kenrick and Keefe's (K & K's) target article is the empirical claim that women are attracted to somewhat older men whereas men are attracted to younger women, and to relatively younger women (though rising in absolute age) as they age. I say "attracted" since this and "preference" are terms that the authors use in their abstract and elsewhere. A first point to make is that this interpretation goes well beyond the data discussed. First, most people, I imagine, never place singles advertisements, and it is questionable whether those that do form a representative sample of the general population. Most people, on the other hand, do marry. But marriage, as K & K sometimes admit, may well be a compromise between the types of partners people want and the types of partners they can get. The same complex motivation might very well apply to singles advertisers, but this data source is so inherently dubious that the issue is somewhat moot. The only solid conclusion is that actual legally sanctioned pairings follow, to some degree, the pattern indicated.

With this qualification I shall assume that the pattern indicated does indeed exist, and has some robustness. K & K are to be commended for at least making a serious attempt to extend their data base cross-culturally and historically. Unfortunately, as is so characteristic of the kind of evolutionary theorizing at which their research is directed, the proffered explanation of

this phenomenon is wholly speculative. This can best be demonstrated by pointing out some equally plausible alternatives. K & K argue against a normative explanation of male "preference" by arguing that the norm "men should be attracted to and marry younger women" fails to explain the behavior of younger men who sometimes prefer slightly older women. In a footnote they reject a more complex hypothetical norm that differentiates the preferred behavior for younger and older men, on the grounds that this norm is not widely recognized as such. But neither of these is the most plausible normative explanation. The one suggested by the data is rather: Women are most desirable within a certain age range (say, 18–30). This would explain the interest shown by younger men in older women, and the behavior of older men as a compromise between the ideal and their decreasing ability to attract members of the ideal group. Is this a recognized norm? I don't know, but I suggest that the question reveals a very simplistic view of norms. (Consider, for instance, norms of grammar.) The invariable use of images of relatively young (arguably even infantilized) women in the media in overtly or covertly sexual contexts, and the promotion of products designed to make older women appear younger, provide clear evidence that such a norm is operating, whether or not most people could identify it as a norm. (K & K do claim [sect. 7] that their cross-cultural data argue against an explanation based on "cultural images," but in the absence of any discussion of the two nonwestern cultures they mention, the argument is hard to discern. Their observation that Indian women past 40 are not considered marriageable suggests that a cultural explanation would be amply justified in at least one of these cases.) An even more obvious factor, which surely explains at least part of the phenomenon, is that some proportion of men are moved to choose women in approximately this age group (18–30) because of a conscious wish for children. It is not obvious that this requires further explanation in terms of ghostly nudges from the primordial past; perhaps it is just the mundane pursuit of familiar goals.

My discussion so far has been largely addressed to the male perspective on the issue, that is, what women are taken to be desirable, and what chance one has of attracting a maximally desirable woman. Unfortunately, this perspective also dominates, and in crucial respects distorts, K & K's analysis. Whether one accepts their genetic-economic model or the norm-based alternative I have indicated, one clear conclusion is that older women are considered largely worthless. K & K remark (sect. 9.6) that older women face an unfavorable situation in the marriage market. Certainly their data do show that a smaller proportion of older women marry or remarry. But this also increases the likelihood that those women who do provide an unrepresentative sample of the wider population. A likely source of bias is obvious: The women who remarry might include a much higher proportion of those who *want* to do so. Reports of the experiences of marriage for women in a wide variety of cultures (relentless hard work, mental and often physical abuse, etc.) and the consideration that most older women will have personal experience of these hardships, suggest that this sample may be very biased indeed. A more gynocentric perspective on his whole issue might suggest that young women marry more often than young men from a combination of social pressure and naïveté, and older women marry less because they have learned better.

The invisibility of these possible female perspectives on the issue displays the androcentric perspective so endemic in this kind of theorizing. The real meaning of marriage for most women is also concealed by the arguably wholly middle-class perspective in which it is at least supposed that marriage is a fairly equal, cooperative venture. Such a class-biased perspective is also suggested by the assumption (sect. 2.2) that males accrue resources and status throughout several decades of maturity. Covert biases in the attempt to provide evolutionary, or for that matter unifactorial sociological, explanations for such social phenomena are no surprise. They simply reflect the fact that, even in the unlikely event that there exists some such simple explanation of such a complex social phenomenon, we are currently in no position to discern it. Abstract and simplistic speculation about such value-laden issues will inevitably do little more than reveal the implicit or explicit value-laden assumptions of the speculators.

Toward a nonarbitrary social psychology

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Speaking of marriage, or at least mating, the cross-fertilization of disparate fields of research is surely one of the most hazardous undertakings a scholar can attempt. My first academic job was in a department of "Humanities and Social Science" (we had two psychologists, two historians, two English professors, two philosophers, an economist, and a political scientist) in a college of engineering and physical science, and the experience was enough to sour me on the putative advantages of interdisciplinary cooperation for years. The universal oneness of human knowledge is all well and good, I decided, but some fields just ought to keep separate from each other lest, like rabid dogs, they tear each other to shreds.

I am finally getting over that experience, because recent developments seem to indicate that different fields of research *can* be combined to mutual benefit, at least sometimes. The target article by Kenrick & Keefe (K & K) is a sterling example. This research contributes some important evidence, of a sort it is hard to imagine evolutionary biologists gathering or knowing how to gather, to the theory of natural selection as applied to mating behavior. The contribution this sort of research makes to social psychology may be even more important because it seems to reflect a significant recent development in the evolution of that field.

For the past 20 years or so, philosophy of science, literary theory, and certainly social psychology have shared what one author has called a "unidirectional march toward constructivism" (Stanovich 1991, p. 78). The "constructivist" view, exemplified in psychology by the New Look approach to perception as well as by most research on attribution theory, is that human perception and behavior is influenced largely or perhaps even exclusively by the mind and its (culturally determined) constructions, rather than by the nature of objective reality. Indeed, in the strong form of the constructivist approach, the very existence of objective reality is doubted (see Jussim, 1991, for a review).

Social psychologists have been good soldiers in Stanovich's "unidirectional march." K & K vividly illustrate how social psychology has been wont to treat important behavioral norms as underdetermined by reality; mate selection, they point out, has traditionally been treated "in terms of historically *arbitrary* normative pressures": Males are valued for economic success and females for physical attractiveness because of "tradition" (Brehm 1985). Presumably, if tradition were different, these preferences could be reversed.

K & K shoot this idea down rather effectively. Traditional sex differences in mate preference, they argue, are not arbitrary, but rooted in the differential contributions to reproduction by males and females, and the world in which they both must live. In the *actual* world, one might add: There is nothing arbitrary, culture-specific, or "constructed" about the processes of survival and reproduction that lie at the heart of natural selection.

This way, K & K's target article can be viewed as part of what Stanovich believes is an emerging "backlash" (1991, p. 78) against extreme constructivism. Evolutionary theory has for

some years provided an important underpinning for nonarbitrary explanations of perception, for notable example the perception of color (Berlin & Kay 1969). K & K's marriage of "social psychological and evolutionary approaches" uses the same basic approach to begin construction of a nonarbitrary *social* psychology, one that can move beyond the field's historic tendency to view cultural norms as things that can – poof! – appear from nowhere.

A recent movement away from extreme constructivism can be seen in other areas of social psychology as well. An area close to this commentator's heart is the accuracy of personality judgment. For years, social psychologists shied away from this obviously interesting topic like a horse from a snake apparently because, as Cook (1984, p. ix) argued, "accuracy of perception implies a reality to be perceived, and the current . . . approaches to social psychology tend to deny any such reality." More recently, however, social and personality psychologists have garnered the courage to undertake the task of formulating realistic and reasonable, if imperfect, criteria for the accuracy of social judgment and have begun investigating the degree to which, and the circumstances under which, interpersonal judgments intersect with social reality (e.g., Funder 1987; 1989; Jussim 1991; Malloy & Albright 1990; McArthur & Baron 1983).

Intellectual trends, like all other trends, seem to swing back and forth. The past three decades' swing toward constructivism was a valuable and inevitable correction of the previous swing toward positivism. A swing back seems inevitable, however, and seems to have begun. I don't think anybody hopes for, or expects, a return to logical positivism. But there is something refreshing about the way the work of K & K and others is beginning to produce a nonarbitrary social psychology that, in an important sense, is returning to reality.

Toward a more complete integration of evolutionary and other perspectives on age preferences in mates

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Kenrick & Keefe make a very important contribution by demonstrating that normative explanations of male-female differences in age preferences in mates are inadequate by themselves, and they take a large first step toward combining an evolutionary perspective with the social and cultural explanations favored by social psychologists, social anthropologists, and sociologists. My purpose here is to suggest very briefly some ways integration of the perspectives can be continued.

K & K do a good job of drawing out the implications of the cross-cultural and cross-generational uniformities in age preferences for mates; they also report some important differences, especially between the high-status contemporary males they studied in Washington, DC, and the actual pattern of marriages in the Philippines early in this century. These differences are consistent with those I found (Glenn 1989) in a reanalysis of data reported by Buss (1989), that is, the tendency for males to prefer younger mates seems to be less pronounced in modern than in less developed countries. K & K give some possible reasons for this finding but point out the need for further research to investigate its bases.

K & K's explanations for the cross-societal variations are all based on an assumed differential effectiveness of specific reproductive strategies in different societies, but I suggest that in modern societies other kinds of influences become more powerful relative to those that pertain to reproductive success. For instance, K & K point out that the tendency for males to prefer younger females, and the complementary tendency for females to prefer older males, are probably tempered by the need for the mates to be similar enough to cooperate effectively in taking care of their offspring, and that argument makes sense. It is also likely, however, that the desire for similarity becomes greater in modern societies for reasons that have little or nothing to do with reproduction, because intimacy and companionship are much more salient goals in marriage in modern than in most traditional societies. (No doubt one could devise a plausible evolutionary explanation for this difference, but it is unlikely that reproductive strategies determine all aspects of mating behavior.) Furthermore, as social and cultural change has become more rapid in modern societies, the formative experiences of persons born only a few years apart have become substantially different, and thus spouses in age-discrepant marriages tend to be dissimilar because of cohort-based influences as well as the development-stage influences discussed by K & K.

Any truly adequate cross-societal, cross-generational explanation for age preferences in mates must take into account the effects of the demographic transition and the social and cultural changes whereby people in modern societies have developed both the desire and the ability to control their fertility. The argument that these changes represent a triumph of culture over evolutionary processes can be rebutted, but the changes probably have lessened the relative predictive power of evolutionary hypotheses and, more important, may have altered the evolutionary processes. Consider, for instance, that in a population in which very few matings produce more than two offspring, males who prefer females in their mid-30s may be at little or no reproductive disadvantage relative to those who prefer females in their mid-20s. If so, any genetically based predisposition for males to be attracted to very young females should gradually decrease.

I agree with K & K that conscious cognitive factors are not needed to explain the effects of an evolved age preference mechanism. That being the case, it would seem better to avoid teleological language insofar as possible in discussions of the inferred effects. When evolutionary biologists refer to the reproductive strategies of insects, it is obvious that they are using the word "strategy" in a sense that does not imply conscious planning to attain a consciously held goal, but the use of "strategy" with reference to humans would ordinarily imply intent and purpose. Whether authors intend it or not, the use of language that could be interpreted to imply conscious planning to enhance reproductive success may incline readers to think in teleological terms and to prejudge the empirical question of the extent to which conscious reproductive motives intervene in the causal chain from genetics to age preferences. Aside from their use of the term "reproductive strategy," which is used by virtually all evolutionary theorists, Kenrick & Keefe generally avoid inappropriate imputation of conscious seeking of reproductive goals, and other scholars and researchers who do work on this topic would do well to follow their good example.

Disciplinary chauvinism and ideological bias lead many family sociologists and other family social scientists to reject evolutionary explanations out of hand. That is unfortunate, because this target article and the work that will build on it have great potential for enhancing the understanding of patterns of formation and dissolution of marriages and other close heterosexual relationships.

Variations on a theme: Age dependent mate selection in humans

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As Lockard and Adams (1981) have pointed out, "it appears that females may be more disposed to monogamy than are males,

some of whom may prefer polygyny if not constrained, either culturally or economically. Given the latter two factors, then certainly serial polygyny is a viable compromise in our society and one which some males may be currently employing as a mating strategy" (p. 185). This statement was made after observing age differences in couples in shopping malls, and this finding has been replicated on a broader basis by Kenrick & Keefe (K & K) in their target article. Thus we find here a replication of an older study and are confronted with what they call age-dependent mate-choice strategies in humans as a matter of "hard scientific fact." Our own observations in a German computer dating service underline the validity of their findings (N = 1048 females and N = 1590 males).

Nevertheless, the argument of K & K has severe difficulties and is sometimes wrong. The first problem lies in the fact that K & K mix proximate and ultimate explanatory principles in trying to build up a dichotomy: cultural versus biological explanations. The second problem is that they call age-dependent mate choice a "life-time-history-strategy," an argument I cannot follow from their data because I am unable to see the age-dependent switching between two different tactics. There appear to be two different tactics if we focus on age differences between partners – not when we look at the actual ages. Males might look, independent of their own age, for females of a certain age, that is, those at their optimal reproductive stage. The existence of life history strategies can be demonstrated only if males who marry a second time significantly more often choose females substantially younger than their first spouse.

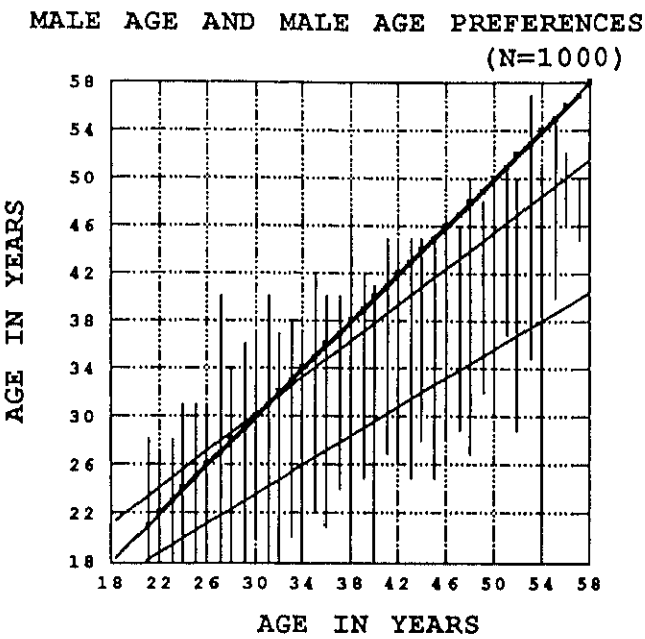
In addition, the fact that younger males also marry women slightly older than themselves is no evidence against a cultural norm that one should "marry younger," because even cultural norms can be stratified, that is, they might hold only for specific age stages. Thus the dichotomy of cultural norms vs. biological imperatives is not a very useful one – cultural norms might exist to enforce biological necessities, because the capacity to develop norms is also an effect of evolutionary processes (Lumsden & Wilson 1981). [See also *BBS* multiple book review of Lumsden & Wilson's "Genes, Mind and Culture" *BBS* 5(1) 1982.]

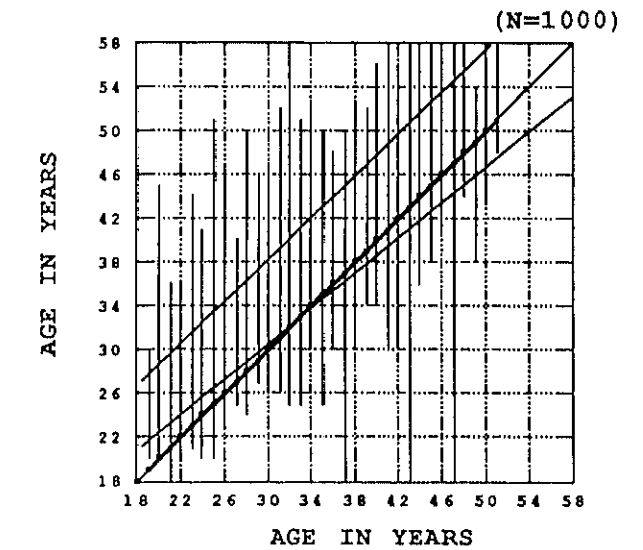
If we look at actual distributions of age preferences, we find considerable variation. The variations in data on human mate choice, although they show the same central tendencies across cultures and across time, are much higher than one would suppose. K & K themselves do not present the variation, so I will do so (see Figures 1 and 2). The figures show actual age on the diagonal line; the upper line shows the regression line for the upper limit people search for and the lower line is the regression line for the lower limit, whereas the vertical lines indicate the age span for the preferences.

Figures 1 and 2 clearly show the same results as K & K, but they also show the high amount of variation. I hypothesize that this variation is an outcome of different calculations and weighting of cost-benefit processes in courtship and mate selection. If males look for partners at their maximum reproductive stage and females look for high-status males, a considerable amount of competition will take place. Moreover, other mate-choice factors are not independent of age – the social status of both males and females changes with age. Thus, on a proximate level we meet a complex interaction of different selection criteria with different costs and benefits.

On a proximate level such problems could be solved by the mechanisms proposed by equity theory or equally by "risk-theory" (Grammer 1989). Both are cognitive theories, acting on a proximate level, that is, they try to explain how decisions come about. They only describe the outcome of mate choice on a proximate level. Life history theory, in contrast, operates at the ultimate level of explanation, although it needs proximate mechanisms to operate.

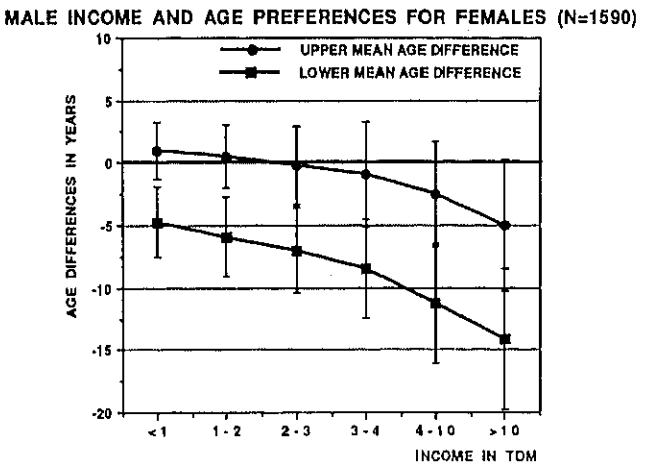
Let us take the example of status and age preferences. At the proximate level possibilities of choice for a younger male are limited because the number of females at the maximum reproductive stage is low in his own age class. He therefore has more possibilities for choice if he extends his search level upward in age. At the ultimate level, he should do so – because an older female is more experienced, and his investment in possible offspring is less endangered; thus a norm such as "young man marry younger woman" is not likely to exist. But why, if females are attracted to high-social-status males, should the female decide for a young, possibly low-status male? We have to note that it is not only the actual male status but more the explanation of how long and how much the male might invest in the future. Her actual choice thus depends on the actual distribution of high-status males in different age classes, the expectation of how long a male can still invest ("risk"), and how much

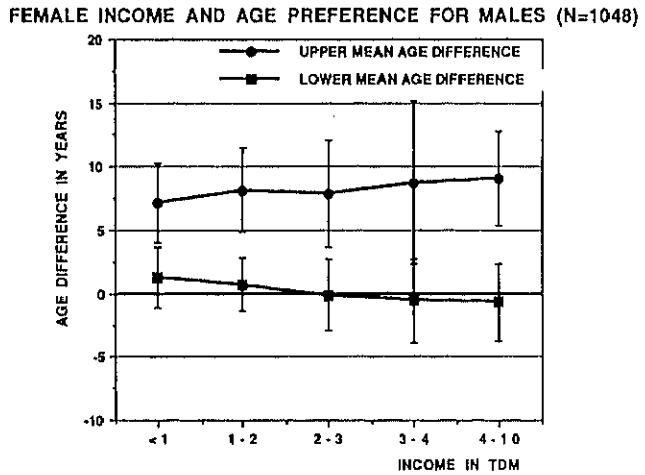




Figures 1 and 2 (K. Grammer). These figures plot the actual age of the male against itself (Fig. 1) and that of the female (Fig. 2) as the diagonal line, with vertical bars indicating the span of age preferences at the respective age. The upper line shows the regression for the upper boundary of age preferences; the lower line shows the lower boundary for age preferences. The figures indicate that only males prefer partners who are older than themselves, although there is high variation.

investment may be necessary. Naturally, this expectation of possible and necessary investment decreases with the age of the male, thus counteracting the possible higher market value of higher status in older males. But along with this the market value of the female is decreasing because her own reproductive potential is becoming less. Her wish for partners is thus optimized by counteracting forces, which lead to a choice of slightly older partners. The male finds himself in a comparable yet different situation: Although his status and his potential to invest might increase with age, his market value for females decreases. Thus his actual preferences could be optimized by the condition of less constraints than for females, which could lead to an age-dependent decrease in age preferences; this is independent of the life history strategies proposed above. Our data suggest that for males there is almost a fourfold decrease in age preference for younger partners with increasing income of the male (see Figures 3 and 4). This is not so for females, where the variation (i.e., the age span in choice) increases with increasing female status. But here we meet a problem, because causes and effects cannot be separated: In both males and females income (status) correlates positively with age (females $r = 0.37$ $p < 0.0000$; males $r = 0.32$ $p > 0.0000$). Now is it age or status that produces the effects? In addition, the effect is more pronounced





Figures 3 and 4 (K. Grammer). The figures show male (Fig. 3) and female (Fig. 4) net income in classes of thousand German marks and the upper and lower mean boundary of age preferences for partners in these classes. The line through zero marks the age of the subjects themselves. The figures show that only males seek younger partners with increasing income. This is not so for females, whose age preferences do not vary with net income.

for divorced males (nonmarried lower age preference = −6.33; divorced males lower age preference −10.06 years). Thus, divorced males may switch to a different life strategy. Indeed, an analysis of variance shows (when controlled for age) a two-way interaction between marriage status and income: The higher the divorced male's income, the younger the female has to be and the less tolerant the male is of females older than himself ($F = 224{,}30$, $df = 4$; $p < 0.00$).

The same game can be applied to the interactions between "wish for children," "actual number of children" or "interest in and orientation to sexual activities" with age preferences, which indeed show correlations in our data: "Wish for children" correlates with increasing age in both males ($r = 0.45$) and females ($r = 0.60$), whereas the wish for a "sexy partner" increases linearly with income in divorced males (not in nonmarried males [ANOVA $F = 6.68$, $df = 1$ $p = 0.01$]). Thus, divorced males are more sex-oriented with income, but not with age. This means that the "heterosexual stock market" is not so homogeneous as is proposed – besides attractiveness and social status, a number of other factors may play a prominent role.

This short and simplified approach shows that mate-selection criteria might be numerous and that we find different possible strategies in calculating costs and possible benefits. Mate selection thus poses a multiple constraint optimization problem for the cognitive apparatus. This makes it necessary to create a theory that might explain the variation and not the mean of mate-selection processes, before we move on to the unstable grounds of ultimate explanation principles. Consequently, as has also been pointed out by K & K, this theory has to be a cognitive theory (Grammer 1989).

Yet the main problem is that we deal with ultimate post hoc hypotheses that are applied to well-known empirical facts. There is only one solution to the problem: gathering better data that can be studied in all the aspects proposed above. Methodologically, there seems to be only one solution, the triangulation of data. Triangulation means gathering data where an actual age preference is present and where we have access to sociometric and psychological data on the same person, which can finally be compared to the actual age of the partner that person marries. One source of such data is computer dating services; our own experience shows that these sources are rarely reliable and need permanent control and surveillance in data gathering. Thus it will take another few years to get the quantity of data necessary for applying multivariate methods before we are able to solve these complex problems.

Although our sample may not be representative, it is a tentative approach to generating new and better hypotheses: a biological theme with cultural and cognitive variations.

Age differences between mates in southern African pastoralists

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The pattern of age preference and age differences between spouses that Kenrick & Keefe (K & K) have found is impressive. The agreement between preferences derived from statements made in advertisements and actual behavior derived from marriage records is a surprise. Along with many anthropologists I am inclined to be cynical about the agreement between what people say and what they do.

All the societies examined are European and Asian societies where marriages are durable and where males are expected to provide resources for the wife and her offspring. It may be of interest to examine age differences the same way from an

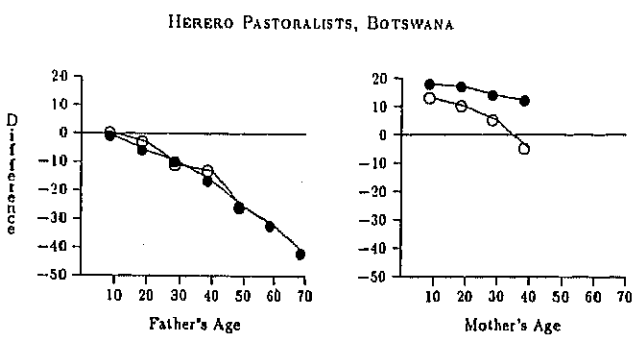

Figure 1 (H. Harpending). Age difference between mates among Herero pastoralists. Marital births are indicated by solid circles, nonmarital births by open circles.

African society where marriage has a very different meaning and entails different expectations from those in most Eurasian societies (Draper 1989).

Figure 1 shows age differences between parents of approximately 1,800 Herero-speaking people of northwest Botswana. The Herero are prosperous cattle and goat ranchers of the northern Kalahari desert who speak a Bantu language (Gibson 1959; Harpending & Pennington 1991; Pennington 1991). They maintain a staunch ethnicity and a rich traditional life while participating enthusiastically in the educational system and economic development of Botswana.

Although most Herero marry, more than half of first births to women but fewer than half of all other births are to unmarried women (Pennington 1990). There is no stigma attached to nonmarital births – on the contrary, it is our impression (untested) that women from prosperous families are less likely to marry because their offspring will receive support and inheritance from their own families rather than from their husbands. Birth interval distributions of married and unmarried women are almost exactly the same.

Many Herero women say that marriage is preferable to not marrying but their endorsement is not enthusiastic. One platitude that we hear is that "life without a man is like meat without salt." Other women say that marriage is not desirable because it means moving away from family and friends to the homestead of a husband. Marriages are frail and divorce is commonplace, especially around the age of menopause of the wife.

Women and men both own cattle. At marriage women may move part of their herd to the homestead of the husband, then bring in more and more of them as they decide to remain in the marriage.

Ages were ascertained through the Herero system of year names, which has been aligned with Gregorian years back to 1830. The year of birth of individuals is an important part of their identity and is widely known. It is an indication of the insignificance of marriage in the personal lives of many people that informants who could tell us the birth years of all four grandparents often did not bother to remember the years of their marriages and divorces. We also found that men and women occasionally did not agree about whether or not they were married to each other, men claiming that a marriage was in force and women denying it.

Because male parental investment is not as central to female reproduction in this society as it is in many Eurasian farming and industrial societies, age differences between mates might be less and might reflect availability of partners determined, for example, by the population age distribution. The figure shows, instead, that the pattern among the Herero is exactly the same as the pattern documented by K & K except that the average difference is greater.

I expected that the parents of nonmarital births would be closer in age, reasoning that nonmarital births would reflect partner preferences whereas marital births would reflect the preferences of older family members who arrange marriages. Although there is a slight tendency in that direction the effect is not strong. Women choose slightly younger consorts than the husbands chosen for them (in theory) by their families. Apparently the same preferences that K & K found in their Eurasian samples are expressed in this African society.

Biological versus social psychological bases of mate selection

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If Kenrick & Keefe (K & K) were arguing only that theories of human mate selection have often ignored people's age-linked reproductive capacities, then we would see little to dispute. Social psychological theories of attraction and partner choice have indeed focused more on companionship and friendship than on potential parenthood, and a mate's "reproductive potential" has usually been ignored. A remedy would be for theorists to qualify statements about human mate selection – which already include the determinants of partner attractiveness and similarity – by including a mate's reproductive capacity in the list. But K & K's agenda seems broader than this, and we do not find their larger case very convincing. Below we outline three areas in which we find their model problematic.

Problems with the biological model. Before turning to the social psychological terrain with which we are more familiar, we tackle the model on its own sociobiological turf. First, it does not specify exactly how similarity and age preference are hypothesized to have been selected for during human evolution. For example, are females' mate preferences based on *age*, because males' age is correlated with status and power? Or are females simply predisposed to prefer males of high dominance status – a variable that is correlated with age? If the latter (which seems more parsimonious), the age data merely represent an evolutionary by-product or confound. The problem is even more salient with respect to similarity: Are males and females genetically predisposed to seek "similar" mates in a generic way – in which case age similarity is just an example – or only with regard to age? The model seems unacceptably imprecise on these critical points.

Second, the standard investment-theory model as applied to mammals predicts that males should not be highly selective about mates. K & K, along with others they cite, have revised this model in its human application because, in contrast to most species, human males invest heavily in their offspring. It seems problematic to cite one evolutionary fact as a basis for explaining another, however, as if the former could be regarded as causally prior to the latter. Male investment in offspring presumably coevolved along with K & K's hypothesized age preferences. A convincing sociobiological model would explain both principles as part of the same package, rather than simply assuming one to explain the other.

Third, we agree that "the evolutionary model does not offer as clear a prediction for females." K & K's hypothesis of female age preferences seems post-hoc and is less than convincing. If male power is related to age in a curvilinear fashion as they suggest, then it is not clear why females beyond a certain age (whatever age represents the peak of male power and status) should continue to prefer older males. At some point females should begin to prefer males their own age, based on similarity and future care-giving considerations, and beyond that point males who are younger than they. Just as the male age-differential curve crosses the same-age threshold in the early 20s (with the

youngest men marrying slightly older rather than younger women), the female curve should cross the same-age threshold around, say, age 50. The data do not fit this model, however, which seems to us the more reasonable one.

Problems with the data. Although one might expect six studies with convergent findings to make a persuasive case, we do not find the data convincing. First, K & K present few data that are truly cross-cultural. Nearly all of the data are American or European (albeit somewhat intergenerational). The Indian data – drawn from advertisements in only one high-status urban newspaper – omit (for *cultural* reasons, we must note) females beyond the age of 40, which is disquieting in light of the alternative female-preference hypotheses suggested above. The Philippine marriage data are more complete, but K & K's own comparison of these data with those of high-status Americans suggests the possibility of noteworthy differences. Even if the Indian and Philippine data were to converge neatly on the American data, however, a much larger sample of cultures would be required to make a convincing case for strong cross-cultural generality. This is true with respect to any sociobiological argument, but it is particularly crucial here because courtship and marriage are strictly governed by societal norms and conventions.

Second, other data do not fit the K & K model so well. More extensive U.S. data show that even at 18 years of age, the average U.S. man married a woman younger than himself rather than women in the 20–25 year range; in addition, women in their mid-60s and older tended to marry men of the same age rather than older men (Jacobson 1959, p. 63). Even data on nonhuman primates pose problems for a simple sociobiological model of mate selection. For example, one study of three groups of seasonally breeding macaque monkeys found no strong correlation between social rank and frequency of copulatory behavior (Stern & Smith 1984). Another study, using genetic markers, found no correlation between number of offspring and the father's social rank (Shively & Smith 1985). Moreover, male and female dominance hierarchies predict who is likely to mate with whom in public, but not in private encounters (Drickamer 1974). All these findings suggest the need for a much more complex biological model than that proposed by K & K.

Level of analysis. When push comes to shove, mate selection is a social process, not a biological one. A host of complex social, psychological, and environmental variables are involved in any particular individual's choice of mate. Some of these variables may be traced to biological/genetic origins and others not. But even granting that some of these factors are genetically grounded, their manifestation is mediated by more proximal variables. As social psychologists, our own focus is generally on these more proximal factors. We need to be convinced that we gain something of importance by incorporating a "life history" model into our theorizing.

We ask, does a sociobiological model represent an alternative level of analysis relative to social psychological and sociological approaches? If so, what is to be gained by moving from a social psychological level of analysis to a biological one? Automobile travel is ultimately founded on principles of physics, but quantum mechanics offers little to city planners trying to explain traffic gridlock. The crucial question to be confronted is: How should these differing levels of analysis be integrated? K & K recognize that biological factors are modified by cultural and environmental factors; and they do not argue for a "simple hard-wired mechanism." But their model stops short of tackling this deeper problem in a satisfying way.

K & K consider the mean ages for mate preferences but say nothing about the *variation* around these averages. Their model cannot explain such variance, only the pattern of means. The variance derives from such social and psychological factors as decisions to remain childless, cultural and subcultural norms, individual family or financial pressures, and a host of other variables about which biology has nothing to say.

In short, we agree with Kenrick & Keefe's conclusion that "a consideration of life history strategies raises questions that connect developmental psychology, social psychology, and evolutionary biology." Yet we are not convinced that such models, or this model in particular, provide many useful answers to those questions.

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On building bridges between social psychology and evolutionary biology

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Evolutionary theory can enrich social psychology when it (1) suggests underlying psychological mechanisms, (2) generates interesting new hypotheses, (3) leads to new insights about such classic issues as the consistency and inconsistency of social behavior, and (4) helps social psychologists to break theoretical "sets." Kenrick & Keefe's (K & K's) research is interesting because it achieves each of these goals.

1. Suggesting psychological mechanisms. K & K demonstrate an interaction effect (men's but not women's age preferences for mates change over the life span), and it is this interaction that suggests an underlying evolved mechanism. "Main effect" findings (in this case, on-average sex differences) would be relatively more open to competing explanations (such as social norms). Evolutionary theory is likely to be particularly useful in social psychology when it generates subtle predictions derived from hypothesized underlying psychological mechanisms.

Based on their findings, K & K argue that men have evolved to be attracted to signs of youth and beauty in a mate, whereas women (perhaps in a less fixed way) have evolved to be attracted to signs of dominance and status. Indirectly, K & K pose a number of basic questions about the nature of naturally selected psychological mechanisms of heterosexual attraction: Are their sensory inputs "hard wired" or learned? Are inputs processed variably or invariably across situations and over time? Do mate assessment mechanisms operate consciously (e.g., as explicit economic calculation) or unconsciously (as stimulus-bound emotional attractions)? Are the answers to the previous questions the same for men and women?

2. Generating new hypotheses. The application of evolutionary theory to human mate selection is interesting if it generates novel hypotheses. One novel hypothesis that follows from K & K's research is that men's and women's satisfaction with mates may not follow a parallel course over the life span, and that men and women may have, on average, different reasons for terminating relationships. After all, youth and beauty are "perishable commodities" in ways that status and wealth are not. Berscheid (1985) has argued that as economic and social barriers to divorce have declined in recent years, the success of a marriage depends relatively more on the "sweetness of its contents." K & K suggest that for men, this "sweetness" may depend relatively more on the spouse's youth and beauty. A number of empirical questions follow concerning men's and women's relative satisfaction in marriage over time, extramarital relationships over the course of marriage, reasons for breakups, and preferences in remarriage partners.

K & K's findings also pose questions about the broader social consequences of heterosexual age preferences. Symons (1979, p. 201) argued that "a woman's physical attractiveness is significant not only in heterosexual interactions that may result in sexual intercourse, but in almost any heterosexual interaction in which male sexual interest can be advantageous to the woman or

to her employer." K & K's findings alert us to the possibility that men's and women's different patterns of preference for youth and attractiveness over the life span may influence social domains other than sexual attraction and marriage.

3. Providing new analyses of the consistency/inconsistency of behavior. K & K state that men's behavior changes over the life span whereas women's behavior is more constant. It is useful to reverse the construal of change and stability here. Indeed, males "change" in their age preferences over the life span, but this is because their "psychological mechanism" is fixed and consistent – it always finds women of a certain age and appearance attractive. Women's temporal consistency, on the other hand, results from a more flexible and discriminating "mechanism" that seems to be less sensitive to rigidly determined physical cues that must match psychological "set points."

This is not merely an issue of semantics. One useful role evolutionary theory can play in personality and social psychology is to put a new perspective on classic "consistency" controversies (e.g., see Buss 1991; Tooby & Cosmides 1990). By hypothesizing functional mechanisms, evolutionary theorists encourage psychologists to discern possible genotypic temporal and cross-situational consistencies in behavior despite apparent phenotypic inconsistencies.

4. Breaking metatheoretical set while still embracing social psychology. Evolutionary theorists encourage social psychologists to conceptualize research topics in new ways. For example, social and personality psychologists have examined the topics of gender and sex differences from many different perspectives, usually with an emphasis on environmental, social, and cognitive factors (e.g., see Ashmore 1990; Lippa 1990; Spence et al. 1985). Evolutionary theorists encourage a different perspective when they describe the biological sexes as "morphs" – that is, alternate forms within a species that differ not only in structure, but in the patterning and adaptive functioning of that structure (Tooby & Cosmides 1990). This view encourages researchers to look not simply for "main effects" (i.e., sex differences) but, more subtly, for a different *adaptive patterning* of variables within each sex.

While embracing evolutionary theory, K & K do not reject social psychological principles or research. They note, for example, that people seek similarity in mates and that, for men, tendencies to choose similar mates must be "combined" with preferences for youth and beauty.

Considerable social psychological research has addressed information combination (e.g., Anderson 1981); this research could be useful in probing evolved "psychological mechanisms" of sexual attraction. One possible hypothesis: Evolutionarily fixed cues of sexual attractiveness (e.g., women's age and physical appearance, as perceived by men) may be more heavily and immediately weighted than other cues, and more subtly, such cues may be relatively impervious to "change of meaning" effects resulting from informational context or to reinterpretation based on prior information (for an overview, see Fiske & Taylor 1991). In other words, mechanisms of social perception may sometimes have evolutionary constraints. More broadly, social psychological research generated by evolutionary theory can and should be integrated with "mainstream" social psychological research.

Conclusion. Kenrick & Keefe's research shows that social psychological research can help test and refine evolutionary hypotheses and that evolutionary theory can serve both to challenge and to complement social psychological theory.

Individual differences in reproductive tactics: Cuing, assessment, and facultative strategies

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In recent years there has been rapid progress in the incorporation of findings of cognitive and social psychologists into the domain of evolutionary theory and sociobiology (Barkow 1989; Boyd & Richardson 1985; Cosmides & Tooby 1989; Crawford et al. 1987). On the whole I find this endeavor eminently logical and highly successful. The Kenrick & Keefe (K & K) target article is another such endeavor, and I find it, too, logical and largely successful. In fact, the ease with which K & K demonstrate the fit of their data with the evolutionary model suggests patterns so robust that cognitive and social psychologists could not have missed them; rather, it is more likely that their models say the same thing using different language.

To wit, traditional equity and exchange theory do not specify or require that the units of exchange be economic, nor that the parties to the exchange share the same evaluation of the units. To give a simple example from a context in which equity and exchange theory are often applied (marital decision-making): One party to an exchange (A) might detest budgeting tasks whereas the other (B) finds satisfaction in them; although B doesn't mind performing the tasks, and in fact gets enjoyment out of them, if B is aware of A's value system, that information may allow B to bargain for some additional "benefits" in "exchange" for doing the tasks that A detests. Such bargaining strategies are possible not only because there are individual differences in what the parties have to offer but also because of differences in their relative estimation of the worth of those offerings. It seems to me that the critical component of K & K's article attacks a straw man; their results, however, no matter how paraphrased, are important.

K & K point out quite rightly that one's sex and age are factors that will affect how one values the attributes and skills offered by potential partners in exchange and that these differences should be predictable based on evolutionary logic. The data they present here, along with those of others (Buss 1989; Buss & Barnes 1986; Nafiey 1981; Remoff 1980), support Eckland's (1968) contention that the criteria used for mate selection should be those that are "functionally relevant" (p. 75). Similarity theory, or assortative mating, can be explained by a combination of functional values (Rushton 1989; Theissen & Gregg 1980) or as a byproduct of competition (Burley 1983; Sloman & Sloman 1988). Symons (1979) has pointed out that what is functionally relevant for males will not be functionally relevant for females, and others would further posit that what is functionally relevant may even differ for individuals of the same sex, depending on both genetic and environmental accidents of fate (Belsky et al., in press; Blain & Barkow 1988; Draper & Belsky 1990; Draper & Harpending 1988; Mealey 1990). (I suspect for example, that there is a significant cohort effect in the K & K data comparing Phoenix marriages of 1986 versus those of 1923, although they appear not to have done the relevant analyses.)

K & K are moving in the right direction. The hard part of this endeavor, however, sorting out the causes of individual differences in values and assessments related to exchange and other aspects of reproductive strategy, is yet to come, and it may be harder than we anticipate. K & K argue that, unlike the social psychology models that rely on "more or less conscious weighting of rewards and costs, emphasizing 'perceptions,' 'expectations,' and 'attributions' in the assessment of equity . . . an evolutionary model . . . presents the exchange process based not on arbitrary norms, but on the hard currency of biological fitness and reproductive value." I would argue that fitness and reproductive value are not "hard currency" at all: Although

there may be statistical trends in the relationship between certain phenotypes and reproductive success (e.g., Flinn 1986; Hill 1984; Mealey 1985; Voland 1990), these are predictable only in an actuarial sense, not on an individual level – the level at which exchange evaluations and decisions must be made. In addition, it seems that the cues individuals use to assess their own status may be relative rather than absolute (Hill & Hill 1988; Houseknecht 1979; Mealey & Mackey 1990; Mackey & Mealey, submitted), and the magnitude of even evolutionarily and statistically significant factors may not be as large as we expect (Mealey et al. in preparation). [See also Vining: "Social Versus Reproductive Success" *BBS* 9(1) 1986.]

On the other hand, the study of individual differences in human judgments may at least be easier than the equivalent study in other species. (See précis and commentary in this issue on Cheney & Seyfarth's *How Monkeys See the World*). Kenrick & Keefe argue that the judgments and evaluative processes that are relevant for the exchange process (according to the evolutionary but not the social psychology model) "are not necessarily accessible to conscious calculation, but reflect evolved adaptations that may operate below the level of consciousness." In spite of this, people do express consciously different preferences for potential mating partners compared to potential dating partners (Buss & Schmitt 1989; Kenrick et al. 1990; Nafiey 1981; Remoff 1980), and they can (at least sometimes) give rational explanations for their reproductive decisions (e.g., Davidson & Jaccard 1974; Hass 1974; Moss 1964). This partial awareness and expressive ability may at least point us in the right direction.

May/December romance: Adaptive significance *non probabilis est*

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The study of human behavior has been divorced from biology during most of this century. The process of evolution through natural selection has provided the unifying theoretical framework for understanding the causes of all animal behavior except that of our own species. From an evolutionary point of view, the purpose of life is to reproduce. All behavior is ultimately directed towards surviving, breeding, or increasing the probability that the offspring survive. The rules of the game are simple: Make as many successful offspring as possible. Acceptance of the principle that behaviors are evolved and adaptive traits has provided a common theme for the study of behaviors as diverse as insect nest building and primate social behavior. Although they, too, study animal behavior, social psychologists have generally not adopted an evolutionary perspective in their work. The reasons for this are varied: a lack of interest in biological explanations, the perception that humans are too complex or special to be understood through simplistic evolutionary models, and even political correctness. The target article by Kenrick & Keefe (K & K) represents an attempt to synthesize social psychology with evolutionary theory and sociobiology.

Although we are encouraged by this attempt to apply evolutionary theory to human behavior, it is also evident that pitfalls await anyone trying to address the adaptive significance of human behavior. First, it is easy to confuse levels of analysis and to make inappropriate conclusions: Ultimate causes may easily be misconstrued as proximate causes. Second, assigning adaptive significance to a current behavior that evolved in a habitat no longer occupied by the species may provide an erroneous interpretation of the current and past adaptive significance of that behavior (Gould & Lewontin 1979; Williams 1966). It is seductively easy to assign adaptive function to human behavior in the absence of data that support the assertion.

The generic question that all students of behavior address is: What causes individual A to emit behavior Y (Sherman 1988)? This question can be asked and answered at a proximate as well as an ultimate level of analysis. For example, why does a male canary sing? At a proximate level, the physiological mechanisms responsible for bird song can be studied. A male canary sings because his testes secrete testosterone, which stimulates the development of the syrinx and brain centers that control singing. At an ultimate level, the evolutionary history and adaptive significance of the behavior can be assessed. A male canary sings because it attracts females and wards away intruding males. Although the two levels of analyses interact, they are distinct. Ultimate explanations deal with the way an animal ought to interact with its environment to maximize its reproductive fitness, whereas proximate explanations deal with the physiological or cognitive mechanisms that produce behaviors that may or may not fulfill these functions. The point that must be kept in mind is that what an animal should do to maximize its reproductive fitness does not constitute a proximate cause for a particular behavior.

The second concern associated with adaptive accounts of behavior is that behaviors are often assumed to be adaptive without an empirical measure that supports the claim. That is, data are rarely presented to show that animals exhibiting a particular behavior enjoy a greater reproductive success than individuals that do not exhibit that behavior. K & K's data conform to their theory that human mate preferences are an evolved trait that reflects different life history strategies of males and females. Data that conform to a hypothesis, however, do not constitute a critical test of a hypothesis. The critical test of K & K's hypothesis would require a demonstration that men who inseminated women younger than themselves enjoy greater reproductive success (on average) than men who do not inseminate younger women, as well as a demonstration that women who are inseminated by men older than themselves have higher reproductive success as compared to women who have children fathered by men of equal or fewer years.

Establishing that a behavior increases the reproductive fitness of an individual is not an easy task. How does one define reproductive success among humans? From a strictly evolutionary perspective, a reproductively successful individual is one that manages to produce *more* reproductively successful offspring than other individuals. Is this a reasonable measure by which to judge human reproductive success? Measuring fitness is difficult because it is by definition a post-hoc measure. For instance, by scanning the local telephone directory we can discern that the progenitors of the Smiths were wildly successful relative to the progenitors of the Zwanickis, but we cannot predict the fitness of current Smiths or Zwanickis. The cultural norms among western societies today appear to discourage producing large numbers of offspring. If this is the case, the reproductive strategies described by K & K may no longer have any adaptive significance for humans. It could be maintained, though, that these strategies were once significant to our predecessors and persist today because they were never selected against once they ceased being adaptively significant.

Another way to address the functional significance of a behavior is through a comparative analysis. Thus, strategies similar to those described by K & K for humans should be observed in nonhuman primates. A review of the primate literature by Anderson (1986) makes two points that are relevant. First, among reproductively competent females, the ones that are most effective in conceiving and rearing offspring to adulthood are not the youngest; rather, the females that are the most successful are older females who have previously successfully reared offspring. This suggests that males should not mate with young primiparous females if they wish to maximize their reproductive potential. Instead, they should mate with older

females that have had several offspring in the past. Second, the majority of female primates do not experience menopause; they typically do not survive to an age when they can no longer conceive (Lancaster & King 1985). Human females are apparently unique among primates in the sense that they eventually become permanently reproductively quiescent. This last point raises the question of why a naturally selected trait should exist among human males to prefer young females if our ancestors did not live long enough to undergo menopause.

Ultimately, as implied above, any hypothesis that attempts to account for human behavior within an evolutionary framework must be falsifiable based on observations of human behavior. Mayr (1983) suggested that it is not impossible, in principle, to demonstrate that a given trait is adaptive; rather, a trait may be deemed adaptive if several unrelated species that exploit the same environment have acquired the same specialization. Humans occupy an environment quite unlike that of any other species, however; this precludes interspecific comparisons of the sort Mayr suggests. If nothing else, Anderson's (1986) discussion points out that the life history strategies of human and nonhuman primates are not necessarily similar to one another. Should we throw up our hands and give up attempting to explain human behavior in evolutionary terms? No, as with studies of nonhuman animals, we must simply take care not to assume that a given behavior has an adaptive function without empirical support. The cross-cultural approach taken in the target article is a step in the right direction. Nevertheless, to apply evolutionary theory to human behavior, the nature of human reproductive fitness must be more clearly elucidated.

NOTE

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Personal ads as deviant and unsatisfactory: Support for evolutionary hypotheses

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Three of the studies reported by Kenrick & Keefe (K & K) examine data from certain personal advertisements; their analyses are an addition to a growing literature focusing on similar archives. Writers in this domain seldom mention two striking characteristics of advertisements for oneself, however. Research in North America suggests: (a) There is reason to view the use of personal ads as a socially deviant activity, and (b) that as a means for meeting people, personals (and dating services) are evaluated as unsatisfactory. These points might have an important bearing on the utility of personal ad data for testing evolutionary hypotheses.

Personal ads as deviant. Based on clinical impressions from interviews with personal ad users, Darden and Koski (1988) concluded that this means of social contact was a deviant activity. The authors reported that their interviewees approached the actual use of ads with embarrassment and reluctance. Subsequently, users engaged in deviance disavowal, and, if they had discussed the matter with anyone, told only close friends about the behavior. Indeed, users needed such friends to aid in redefining the activity as acceptable.

From a different and more quantitative perspective, in 1990 we obtained a convenience sample of 78 women and 45 men undergraduates here at Indiana University-Purdue University at Indianapolis. They were asked the question: "Do you think the use of personal ads is a normal (desirable) or deviant (undesirable) way to meet people?" Responses were made on a 10-point, bipolar scale having the endpoints "normal" and "deviant" scored as 10 and 1 respectively. Results for both genders were similar: Average scale scores of 4.32 for women and 4.42 for men fell on the deviant side of the scale.[1] To put it another way, 81 respondents placed marks somewhere on the deviant side, whereas 42 marked the normal side, $z = 3.42$, $p < .01$, a ratio of nearly 2:1.

Personal ads as unsatisfactory. Perhaps as a result of this tinge of deviance, personal ads and dating services are infrequently used for meeting intimates. This is suggested in a recent poll of Americans showing that 32% of sweethearts met through friends or relatives, 5% met at church, and only 1% met through dating services (Howard & Zeman 1991).

A study of Canadian singles by Austrom and Hanel (1985) revealed a similar picture. In the order of their frequency of use for "meeting people" were: introductions by friends (92%), parties (90%), the workplace (82%), hobbies or sports (80%), singles bars (27%), church groups (26%), companion ads (20%), and dating services (10%). More to the point of evaluation, Austrom and Hanel used a rating scale to determine respondents' satisfaction with these means. For both women and men, companion ads and dating services were the least satisfactory, with average scores located clearly on the dissatisfied side of the scale (see their Table 3).

In discussing the relationship between frequency of use and low evaluations of personals and dating services, Austrom and Hanel (1985) provided an insight into the intersection of defiance and dissatisfaction in this area. They noted that these least used and least satisfactory means require users to privately and publicly admit that they are looking for someone or something. To say, in other words, that they are needy, an admission for which they are often stigmatized.

Deviance, dissatisfaction, and evolutionary hypotheses. How, then, does this knowledge bear on the merits of evolutionary hypotheses as offered by K & K? Here we follow the lead of Buss and Irons. In his *BBS* target article, Buss (1989) presented data from many cultures supporting a position that modern sex difference in human mate preferences could be traced to human evolutionary history. Still, in that exposition it was necessary to point out that rural and less educated persons were underrepresented in some samples.

For his part, Irons (1989) saw the skewed samples not as a weakness, but a strength in support of Buss's position. Irons argued that evolved behavioral strategies would be most evident in contemporary social conditions similar to those under which they evolved. Even so, findings from urban and technological societies – which Irons termed evolutionarily novel environments – supported the evolutionary hypotheses. To irons, that support indicated the phenomena are very robust. Of course, Buss concurred with Irons's assessment.

If Buss and Irons are right, our commentary provides further weight for the claims of evolutionary models. Personals (and dating services) occur in the context of an evolutionarily novel environment. Moreover, because it is disparaged and unpopular, the personal ad is, in a figurative sense, a small niche within that novel environment. Relatively few North Americans are seen seeking partners in this particular niche.

Despite the apparent illegitimacy of the personal ad, any review of the literature on personals would support the general position of K & K regarding differential age preferences on the part of women and men. That even the special social world of the modern personal ad could be influenced by evolutionary factors speaks to the potential power of such forces.

NOTE

1. Median ages in our sample (women = 19 years, men = 20 years) were somewhat younger than would be expected of personal advertisers in this part of the United States (see Rajecki et al., in press). Thus these relatively low scores might simply reflect an age-related bias. But over the entire sample, age ranged from 17 to 48, and a near-zero correlation (r) of −.05 between age and score reduces concern about such potential bias.

Age similarity is genetic similarity

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I applaud Kenrick & Keefe's (K & K's) success in joining evolutionary theorizing with social psychology. I beg to differ, however, with their claim that "similar age is no indication of genetic similarity." It certainly is if the comparison is based on the activated parts of the genome, as distinct from the total set.

Aging depends on the activity of timed gene-action systems that switch off and on according to a predetermined plan. To take an obvious example, the physical development from fertilized egg to neonate follows a preordained course in which development starts in the head region and works its way down the body. Average newborns weigh about 7½ pounds but they can double their birth weight by six months and triple it by their first birthday. The sequence of growth during infancy is rapid and uniform. Moreover, identical twins have much more highly correlated pathways of development than do two-zygote pairs with measures made of height and mental development at 3, 6, 9, 12, 18, 24, and 30 months, then yearly from 3 through 9 years, with a final follow-up at 15 years (Wilson 1983). Behavioral discontinuities (walking, adolescence, menopause, senescence, death) may be as strongly rooted in the epigenetic ground plan as are the continuities. Adoption studies show, for example, that premature death in adults has a strong genetic background (Sorensen et al. 1988).

Age is a good predictor of social behavior, cognitive performance, and personality. For example, Eysenck (1988) has shown that from ages 16 to 60, scores in hostility, sociability, and anxiety decline whereas scores in prosocial conformity increase. Altruism, aggressiveness, crime, sexuality, and scientific productivity, to name a few other dimensions, also show predictable changes with age (Rushton 1990). A general conclusion is that the affective turbulence of youth is replaced by the relative calm of age, a view supported by data from research on "affect intensity," which is found to decrease with age (Diener et al. 1985). Epigenetic factors may underlie these trajectories (Plomin 1986). In keeping with K & K's analysis, one proximal mechanism may be changes in androgens.

Although I contend that people match on age and other dimensions because of a genetically based preference for similarity (Rushton 1989), I also agree with K & K's evolutionary model of reproductive potential. Sexual attractiveness in a mate can surely outweigh many other factors. K & K's discussion of how age similarity promotes companionship, bonding, and parenting effort seems fully in keeping with both our analyses. More generally, highlighting group differences in reproductive strategies (not just age and sex, but also race and social class; Rushton 1991) increases opportunity for designing powerful theories of human nature.

The evolutionary model is synthetic not heuristic

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I agree with the conclusion that an evolutionary model of human mate preferences shows considerable potential and that it is largely compatible with, not antithetical to, sociocultural and psychological approaches. I am not convinced that the model has much real heuristic power, however, at least judged by the ability to generate *unique* predictions. Rather, the model's power stems from its ability to integrate and underpin an otherwise motley collection of sociocultural and psychological theories. Granted, Kenrick & Keefe (K & K) use the model heuristically, in particular, to predict their central finding that the tendency of men to prefer women younger than themselves is more marked in older men. But I challenge their contention that a sociocultural social exchange model does not predict this finding. The particular version of the sociocultural model they outline may not, but it can easily be modified to do so.

The first consideration is that the sociocultural norm, "Men should be attracted to and marry younger women" (sect. 9), which K & K take to be the basis of a sociocultural explanation of the tendency of men to prefer women younger than themselves, is surely a straw man. In the American and European societies from which most of the data are drawn there are social and legal constraints on men marrying and having sexual relations with girls below the age of consent, an age that approximates the age of sexual maturity (I am unsure whether this is also true in the Indian and Poro cases). A more reasonable statement of the norm is, "Men should be attracted to and marry younger women *of marriageable age.*" Young men, in their late teens and early 20s, *cannot* marry women substantially younger than themselves. A second consideration is that *any* theory, not just an evolutionary one, that posits that men maximally value *young* women, that is, women at or just above marriageable or reproductive age, predicts K & K's data. We can easily postulate sociocultural reasons for young women being valued. For example, their value may stem from their role as *status symbols* for men: A young, attractive woman on a man's arm may serve a status function similar to that of such material possessions as a large house or an expensive car. The younger the woman, the greater her status value. A status theory is consistent with evidence, from American samples, of a positive correlation between men's status, as indicated by occupational prestige (and so, presumably wealth) and the physical attractiveness of their wives (studies reviewed by Buss 1987; see also Buss "Sex Differences in Human Mate Preferences" *BBS* 12(1) 1989) and with the suggestion, noted by K & K (sect. 1), that women exchange youth and attractiveness for economic security.

My point is not that the status theory is a better explanation than the evolutionary model but simply that the latter model does not uniquely predict the data. Of course, there may be other reasons for preferring the evolutionary model. In fact, this model is capable of subsuming the status theory and integrating it with a variety of other aspects of sociocultural theory. In particular, the evolutionary model explains the basis of many of the values that underlie the social exchanges operating in mate choice.

Consider *why* young women have status value. Their status value could be purely arbitrary; young women happen to be status symbols, but they could equally well not have been. This leaves us with the problem of explaining how the same arbitrary value has arisen in many different human societies. We might also have the sneaking feeling that the value may only *appear* arbitrary because we have not uncovered its true origin. It may be possible to construct a purely sociocultural explanation for status value. If women tend to value economic security and so seek a man who will be a good provider, and if younger, more attractive women are more likely to achieve this goal, a young wife is a sign to the world that a man *is* a good provider, and that he has wealth and possessions. The young wife is a symbol of material success, just like a prestige car, and is valued for the same reason.

The appeal of the evolutionary model, however, is that it does not deny all this but rather shows how it can be integrated into a more all-embracing framework that has reproductive value as its cornerstone. Reproductive value accounts for the value of young women, including their status value. It also illuminates a variety of other values operating in mate choice, including the value women place on economic security, and, as K & K demonstrate, links these aspects of human mate choice with many others and with features of mate choice in animals. The heuristic value of

the evolutionary model may be limited but its *synthetic* power is considerable.

Marital choice and reproductive strategies

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Kenrick & Keefe (K & K) argue that certain aspects of human mate selection can be explained in terms of evolutionary biology more readily than in terms of sociocultural factors. In particular, they claim that males of all ages prefer relatively young women because they have been selected to seek "reproductive potential" in females. The existence of a genetic preference for fecund women would have profound implications for our understanding of marriage and the family. Thus it is only reasonable to give the work of K & K close scrutiny.

To support their claim, K & K essentially do two things. First, they show data for a number of populations indicating that women of all ages prefer men who are about the same age as themselves, whereas men start out preferring women about their own age but, as they grow older, prefer women progressively younger. Second, they argue that their empirical results can be clearly and parsimoniously accounted for by evolutionary theory, but not by social scientific theories. The empirical findings in the paper, however, are *not* new (cf. Bytheway 1981; Carter & Glick 1976; Greenblatt & Smith 1971; Presser 1975; Schoen 1984). Thus, the paper's contribution depends on the validity of its theoretical arguments.

K & K do not provide any genetic or other direct evidence linking marital choice to biological factors. Instead, they argue that the mechanisms involved "reflect adaptations that may operate below the level of consciousness." As they do not say how those adaptations can be identified or measured, their present argument is neither verifiable nor falsifiable.

The target article invokes the classical evolutionary stance in saying that males choose mates with greater reproductive potential in order to maximize their number of descendants. It says little about other choices males participate in that have a substantial influence on their number of progeny, however. In many contemporary Western societies, fertility is now below replacement level because of contraceptive use, even though those populations have an unprecedented biological capacity for reproduction. Relatively few couples have more than two children, and a large proportion of younger persons, around one in four, will probably choose to have no children at all. If reproductive potential is central to an explanation of current age preferences, what role does it play in current low fertility levels? The notion that the genes are involved in some sort of partial micromanagement of reproduction is not theoretically appealing. [See Vining: "Social Versus Reproductive Success" *BBS* 9(1) 1986.]

With regard to female age preferences, K & K argue along different lines, acknowledging that the "evolutionary model does not offer as clear a prediction for females." In fact, the discussion in the target article moves away from biology to argue that females value such things as economic resources and social status. That implies a social/biological interaction, but K & K are very vague about the nature of that interaction and how the biological role in it could be identified.

The theoretical advantages of the paper reduce to its assertion that evolutionary theory "leads to a prediction that would not follow from the social exchange models." Even with inadequacies, evolutionary theory would make a contribution to our understanding of mate selection if it did better than competing theories. K & K do not do justice to their competition, however. Exchange theory is not without its limitations, but it can generate nontrivial, testable hypotheses that have been empirically sustained. For example, making the reasonable assumption that individuals do not want to marry a person with fewer resources than their own leads directly to the proposition that most people will marry someone very much like themselves (Edwards 1969). There is no need for the convoluted argument that seeks to show that "humans may have evolved with a preference for similar mates."

Given that there are social reasons for males and females to value different characteristics in their mates, it is certainly plausible that marriage bargains may involve exchanges of differentially valued traits. In various collaborative efforts using U.S. data, I have found strong evidence for the existence of exchanges involving male economic resources (measured by level of education) and such female noneconomic characteristics as age, race, ethnicity, and mother tongue (Schoen & Thomas 1989; Schoen & Wooldredge 1989; Schoen et al. 1989; Stevens & Schoen 1988). Thus, if older men seek younger wives because they want to have children, they may well be motivated by the *social* value attached to those children, and they may be able to attract younger wives because their greater status and resources compensate for their age. The exchange argument does not preclude the possibility that evolutionary factors are involved, but it does show that they are not needed to explain age differences at marriage.

The social sciences build on a biological base, and a better understanding of how the social and biological elements interact in all spheres of life is badly needed. Efforts to gain such an understanding, however, are likely to entail an appreciation of the strengths and the limitations of all disciplines involved. In that regard, as in its theoretical arguments, the Kenrick & Keefe target article falls short of the mark.

Half a theory and half the data for half the people?

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There are several admirable features of Kenrick & Keefe's (K & K's) target article on age preferences in mate selection. First, in using different empirical methods on people representing different cultures across different generations, they have marshaled strong evidence for the pervasiveness and robustness of their findings. Second, as the authors justifiably note, the pattern of effects they report *is* very consistent and reliable, especially for this particular domain of social behavior. Third, their work extends previous evolutionary theorizing by examining changes in age preference within each sex across the life span. Fourth, the authors have identified and begun to explore an important domain of social behavior where evolutionary and sociocultural theories appear to make different predictions, at least for males.

These impressive and unique features of the target article notwithstanding, several questions remain concerning the meaning and interpretation of the findings. The focus here is on two issues: (1) Are the age preference predictions for women properly framed within an evolutionary perspective and, if not, what accounts for the lack of variability in mate age preference displayed by women across the life span? (2) Given the model advocated by K & K, do one or more proximal psychological mechanisms underlie their age preference effects?

Potential problems for women? As K & K note, evolutionarily based predictions regarding age preferences in mates are fairly straightforward in the case of men. According to Alexander (1987), reproductive effort can be subdivided into three compo-

nents: mating, parental care, and extraparental nepotistic effort. K & K argue that the propensity of men to find women most attractive during the years of relatively high fertility (17–22 for the selection of wives and 23–28 for sex partners; Symons 1979) stems from this first component, whereas their tendency to value age similarity of potential partners tends to reflect the operation of the second component. When men are young, these two countervailing forces are not at odds because women of similar age are in their peak reproductive years. As men become older, however, these two forces should become increasingly antagonistic, given that similar (i.e., older) women have passed their reproductive peak. The operation of these increasingly countervailing forces across the life span, both of which are believed to enhance reproductive fitness, presumably accounts for the negative slope for men reported in the figures.

K & K state that evolutionary perspectives do not offer very clear predictions for women, resting most of their argument on some brief speculations offered by Leonard (1989). In many respects, this theoretical stance seems impoverished. By K & K's own admission, women in our evolutionary past should have been selected to acquire mates who (1) possessed abundant resources and (2) were fairly similar in age so that mates could provide cooperative, long-term care for offspring. Although Buss (1989) has argued that earning capacity ought to be a good contemporary marker of resource potential, several factors influence peak resourcefulness in males (see Jencks 1979; Willerman 1979). Gains in social and economic status with increasing age are tempered by decrements in physical health and virility. Hence, most males in contemporary society should reach their peak in terms of global resourcefulness during their 40s (Jencks 1979), an age at which at least 20 years of paternal care still can be offered (cf. Symons 1979). If women have been selected to find men differentially attractive based on the *joint* consideration of their age of maximal resourcefulness coupled with concerns for approximate age similarity, one would expect younger women to marry relatively older men, with average age differences between the sexes *gradually* decreasing as women become older. Contrary to men, these two countervailing forces should be at odds when women are young because men of similar age have not yet reached their peak years for resourcefulness. As women approach middle age, however, these two forces should become less antagonistic, given that similar (i.e., older) men are at the height of resourcefulness.

This theoretical position is not acknowledged by K & K. What it implies is that a negative slope for age preferences also should have emerged for women. Although this slope might have been more gradual for women (see Leonard 1989), it should have approximately paralleled the one found for men, with younger women marrying relatively older men and age discrepancies becoming *somewhat* less pronounced as women grow older. If this perspective is a viable one, it suggests that K & K may only have half a theory and half the data for half the people – namely, men. At the very least, the predictions and results for women are less satisfying from an evolutionary standpoint than are those for men.

One or two proximal psychological mechanisms? To make the strongest possible claims about the evolutionary significance of human behavior, three types of evidence are required (Crawford & Anderson 1988): (1) Contemporary data must conform to theoretically based predictions; (2) quantitative models must be developed to demonstrate that a given behavior could have enhanced fitness in our evolutionary past; and (3) the psychological mechanism associated with the behavior must be specified, identified, and studied. In this article, K & K focus on the first of these three tasks. Because their predictions and most interesting results tend to be confined to men, most of their speculations about proximate mechanisms underlying their findings are limited to males. Although the intent of their target article was to document a pattern of empirical findings rather than to specify the exact proximal mechanisms that might account for them, K & K seem to suggest that a single, domain-specific mechanism (see Cosmides & Tooby 1987) may be generating their age preference findings.

Even though this conjecture is tenable, at least three considerations argue against it. First, the two primary forces presumed to influence mate age preferences in men stem from different components of reproductive effort, components that ought to differ in their salience and magnitude at *different rates* across the life span. If this is so, two different psychological mechanisms operating in concert may have produced the present findings, one specific to each component.

Second, although it seems reasonable to conjecture that a domain-specific psychological mechanism designed to keep men attracted to younger, fertile women across the life span might have been selected during evolutionary history, preferences for similar-age mates could be a byproduct of very different evolutionary pressures. Preferences for similar others extend well beyond heterosexual relationships (see Byrne 1971). Hence, the desire for similarity might reflect either a more global or different psychological mechanism that may have evolved as much for purposes of promoting survival (i.e., somatic effort; Alexander 1987) as for enhancing reproductive success (i.e., reproductive effort). To the extent that preferences for age similarity did not evolve *specifically* to solve problems associated with reproduction, they do not meet the requirements of "special design" (see Williams 1966). If the two forces that ostensibly generate mate age preferences in males differ in either domain-specificity or origin, they should represent different psychological mechanisms.

Third, concern for similarity might have more recent (and, thus, slightly different) evolutionary origins than concern for fertility. During most of evolutionary history, females may not have lived many years beyond menopause (Daly & Wilson 1983; Symons 1979). Concern for age similarity in the service of promoting long-term, cooperative parental care, therefore, may not have been selected until the typical life expectancy extended well past menopause. As a result, concern for age similarity in mates might have been selected during a later point in evolutionary history than concern for fertility. This would imply that two mechanisms may govern age preferences in men.

Kenrick & Keefe have provided a sound empirical foundation on which future scholars can build. Theoretical and empirical work in the coming decade must clarify why mate age preferences do not vary across the life span for women and identify the precise psychological mechanisms that yield the highly robust age preference effects that exist within each sex.

What does evolution tell us about age preferences?

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As Kenrick & Keefe (K & K) point out in their first paragraph, if the theory of natural selection is going to help us to understand some aspect of human behavior, reproduction seems a safe bet. And indeed, natural selection parsimoniously and elegantly explains the plethora of data showing that males are attracted to females who are in their early reproductive years (the principle of reproductive potential). K & K and others have made a strong argument that this preference is somehow grounded in our biological histories. K & K's data, showing the remarkable consistency with which male preferences regress toward females in their late teens to mid-20s, bolsters this point. The

help provided by the principle of natural selection per se in explaining other phenomena of age preference is far less obvious, however.

The role attributed to natural selection by K & K to explain age preferences is, despite appearances, quite limited. For males, they appeal to the well-established principle of reproductive potential to explain why men prefer youthful women. But they also allow for a social-interactional factor, similarity, to reduce the discrepancy between the theory and the data, which shows that men have some propensity to prefer women closer to their own age. The reason people prefer partners who are similar, according to K & K, is that they are easier to bond and cooperate with (sect. 9.1), which facilitates the task of parenting and grandparenting.

For the theory of natural selection to have any explanatory power beyond the principle of reproductive potential it must address similarity preferences. K & K try to tie these preferences to natural selection, but they fail to clarify anything in the process. By their own account, the key to understanding the similarity component is that people of similar ages tend to get along better, but evolutionary principles are hardly necessary to explain why we prefer mates with whom we get along better. Compatible mates communicate well, function together well, reduce each other's anxiety, and so on. To explain similarity preferences, we can appeal to cultural norms, social dynamics, or psychological propensities without postulating the evolution of some kind of similarity detector, as the authors do (sect. 9.1). The mere fact that people get along with similar others, and that they know this, is sufficient to generate some correlation in age (and other characteristics) of mates. We can understand the role of similarity in age preferences without understanding any evolutionary determinants that similarity preferences might have. We have suggested that similarity preferences were not directly selected for. Rather, the tendency for mates to share similar characteristics falls out of a competitive process in which individuals of equal status tend to end up together (Sloman & Sloman 1988).

As K & K admit (sect. 2.2), the predictions made by natural selection relevant to female age preferences are even less apparent. They propose two opposing forces: (1) Females prefer older males because they tend to have accrued more economic resources and more social status, making them better providers; and (2) females prefer males who are not much older than themselves because they want to ensure that their children will be provided for until they reach adulthood. Note that several patterns of data would be consistent with their hypothesis. Unless we make the strong assumption that men continue to accrue resources and status over their entire lifetimes, we would expect the preference for older males to decline as females age. But K & K can again appeal to similarity, which gives them a third degree of freedom, and justify their move on the grounds that similar mates are more compatible.

The contributions of the principle of natural selection to K & K's argument is that females want their children to be provided for. This seems plausible, but it places few constraints on the data. We agree that the truth lies in integrating psychological and social theory in an evolutionary context. But because explaining the current data primarily involves understanding the determinants of resource accrual, social status, and successful bonding, design principles are of questionable value in further informing a theory of female age preferences. K & K's data show an impressively consistent pattern suggesting that mate selection has some genetic determinants. Their explanation is reasonable, but it does imply that further understanding will be reached through social and psychological, not evolutionary, analysis. Kenrick & Keefe are fully aware of the role played by nonevolutionary factors in determining age preferences. We question whether much that is new has been added by their evolutionary analysis.

Sexual motivation, patriarchy and compatibility

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This provocative target article raises a number of interesting issues, but only three are addressed here. First, I think insufficient emphasis has been given to the fact that whatever selection pressures affected age preferences in mates operated primarily in the environment of evolutionary adaptedness (hunting and gathering societies). Second, the role of the reward value of sexual behavior in shaping age preferences has been ignored. Third, two social factors that affect age preferences – patriarchal social structures and age similarity – deserve greater emphasis.

Kenrick & Keefe (K & K) present an argument, based on Leonard's (1989) reasoning, which suggests that women should prefer men who have enough years left to see the women's last children through to maturity. K & K then suggest that to achieve this goal women should choose men slightly older than they are, if the men have resources. The authors fail to consider the implications of the short average life expectancies of people in hunting and gathering societies, however. In hunting and gathering societies, Leonard's argument implies that women's preference for men should decrease as the men's ages increase. The reason is that the older the men are, the lower the probability that they will live long enough to support their children through to maturity. Also, the older the women are, the younger the men they should prefer to optimize the probability that at least one parent will live long enough to care for their children. Women who reached the age of 50 or so should not care about the age of their mates, however, as their children should then be mature.

K & K also make several additional arguments for why females should prefer older males. They suggest that because females mature at a younger age than men, females at puberty may have to select slightly older males. Within a few years after female puberty, however, there would be no reason for females to select older males, at least for reasons of sexual maturity. Their remaining arguments for female preferences for older males are related to a social factor – the increasing status and resources that males acquire with age. The evidence adduced in support of this argument is from contemporary societies, however. In hunting and gathering societies, the accumulation of status and resources may have been less important than the ability of males to provide protection and to obtain (rather than accumulate) such resources as food. The declines that K & K cite as occurring in men at the upper end of the age distribution – lowered status, resources, and virility – are also much more relevant to modern society than to hunting and gathering groups and probably played little role if any in evolved age preferences among women. Thus, there should have been intense competition among women for young males in hunting and gathering societies.

The results do not fit the pattern predicted by applying evolutionary reasoning to hunting and gathering societies. Although very young women do prefer men somewhat older than they are, older women continue to prefer older men, not younger ones.

K & K argue that teenage men should not show a preference for younger women, but that as men age they should give greater weight to the number of years of fertility remaining to prospective mates and therefore prefer younger women. A different set of predictions emerges when one considers the relatively short average life expectancies in hunting and gathering societies. Men should prefer women as young as possible after the age of menarche to increase the probability that their children will have a parent to care for them through maturity.

Older men, in particular, should prefer young women because this optimizes the probability that the mother will live long enough to care for the children until they are mature. Aside from these age considerations, men should prefer women at the optimum age for successful fertility, no matter what their own age is. Such choices maximize the number of children possessing the men's genes. Thus, there should have been intense competition among men for young women in hunting and gathering societies.

As is the case for females, the data do not follow this pattern. Instead of preferring women at the optimal age of fertility, men display a preference for increasingly older women as they themselves age. By the age of 50 or 60 men are preferring women who are actually beyond reproductive age. The only exceptions are the men on the island of Poro and those advertising in *The Washingtonian*, who consistently preferred women of reproductive age.

If preferences based on the average life expectancies of men and women in the environment of evolutionary adaptedness do not explain the obtained pattern of results, what does?

A second factor shaped by evolutionary pressures does play a significant role in age preferences, but it is not a factor considered by K & K. This second factor concerns the rewards of sexual intercourse. Although reproduction is the crucial evolutionary goal, sexual intercourse and its accompanying rewards are the mechanisms by which this goal is achieved. It seems likely that orgasm evolved because it created a motivation to engage in behaviors that led to reproduction. The ease with which orgasm can be achieved and its reward value apparently differ between the genders. Men masturbate more, more frequently experience orgasm during intercourse, buy more erotica, commit rape more frequently, visit more prostitutes, are less faithful, engage in higher rates of sexual behavior in homosexual relationships, have higher numbers of sex partners, and are less discriminating in selecting sexual partners than women. The lower rewards of sexual behavior for human females did not pose a threat to the species because it is necessary only for the physically dominant gender of a species to be motivated to engage in sexual behavior.

If sexual intercourse is less rewarding for women than for men, women would be expected to weigh nonsexual rewards more heavily than men in their mate preferences. To understand what these other rewards would be, it is necessary to consider the patriarchal nature of nearly all human societies. Because women in patriarchal societies are less likely than men to possess resources and status, they may seek such rewards associated with status as security, material goods, social benefits, and resources related to parental care giving. Because age tends to be associated with the possession of resources in modern – but not necessarily in ancient – patriarchal societies, one would expect women in such societies to have a preference for older men. In addition, mating with older men preserves the status differences between the sexes that characterize patriarchal societies. Violations of such norms typically incur social costs that women (and men) will seek to avoid.

Given their interests in sexual rewards, men would be expected to prefer the most sexually rewarding partners they can find. This means choosing attractive, young, healthy women. The characteristics that are considered "attractive" have probably come under considerable selection pressure. From an evolutionary standpoint, the traits that should be considered to be attractive are those associated with fertility – relative youth (optimal age of fertility), health, strength, wide hips, large breasts, and the absence of visible deformities. Thus, attractiveness is a surrogate for fertility. It is a proximal cause of men's mate preferences, although reproduction is the distal cause. In addition, mating with younger women enables men to maintain their dominant position and avoids whatever social sanctions are associated with violating age norms for mate selection in patriarchal societies.

The data indicate that men do not prefer women who are as close to the optimal age of fertility as possible and women do not always prefer the men who would be most likely to possess resources and status. In particular, older men prefer women who are only somewhat younger than they are and young women prefer men who are only somewhat older than they are. Thus, at least one more factor must be operating. I believe this factor is age similarity. The authors argue that similarity in terms of values, expectations, habits, and *age* may come under selection pressure. Similarity on most dimensions would lead to increased compatibility and that could clearly have had an evolutionary advantage. Similarity of age may not have come under such strong evolutionary pressure, however. Age differences among prospective mates were more constrained in hunting and gathering societies than in modern societies, because of the shorter average life spans in such societies. The stability of hunting and gathering societies would also have meant that there were fewer generational differences to create between-cohort incompatibilities than there are in modern societies. Thus, although similarity in values, expectations, and habits may have come under selection pressures in hunting and gathering societies, similarity in age probably did not.

With the greater age ranges and the rapid social changes that occur in modern societies, age similarity could have a significant effect on compatibility. Thus, a preference for similar-aged mates is a social product of modern societies, based on the anticipated rewards of compatibility. For males, a preference for similar-aged females would temper their preferences for younger females, except among younger males where the two factors coincide. For females, a preference for similar-aged males would temper their preference for older males, except among older women where the two factors coincide. This is the basic pattern in the data presented in this article.

In summary, men have a greater motivation than women to seek sexually rewarding partners and therefore prefer attractive, younger women. This tendency is reinforced by living in patriarchal societies and tempered by a desire to mate with women whose age is similar to theirs. Women, for whom sexual rewards are less important than they are for men, choose partners who offer them resources and status – leading them to prefer older men. This tendency is strongly reinforced in patriarchal societies and tempered by a desire to mate with men whose age is similar to theirs.

Mortality and age-specific patterns of marriage

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Kenrick & Keefe's (K & K's) evolutionary model provides an intriguing explanation for the commonly observed marriage patterns of age homogamy (marriages in which spouses are of similar ages), age hypergamy (marriages in which the husband is older than the wife) and the more rarely observed marriage pattern of hypogamy (marriages in which the husband is younger than the wife). Their model is still not fully convincing, however, because they do not consider some basic demographic scenarios.

An evolutionary model rests on the relationships between parents' characteristics or behaviors and numbers of surviving children. Differential fertility and mortality are thus important considerations. Throughout most of human history, people lived in small societies, often hunting and gathering societies, that were typified by relatively high rates of mortality and fertility. High rates of mortality mean that a large proportion of children born do not survive until the age of reproductive maturity. High rates of mortality also mean that a large propor-

tion of people reaching the ages of reproductive maturity do not survive through the years of young and middle adulthood – the years of childbearing and childrearing. Research by Uhlenburg (1980) demonstrates, for example, that around the turn of the century in the United States – a time when life expectancy at birth hovered just over 40 years – about 25% of children born to young parents were orphaned in childhood by the death of one or both of their parents.

In a society characterized by high mortality, orphanhood increases the already high risk of mortality for children, and the risk of being orphaned is directly related to the ages of children's parents. From the perspective of adults, the age of their spouse at the time of marriage is thus an important consideration. The older the spouse, the less likely that the spouse will survive through the years of childbearing and childrearing and the more likely that the children of the union will be orphaned. Life tables for a high mortality population (see Coale et al. 1983) suggest that the probability of a 20-year-old woman surviving at least 15 more years, which is about the minimum length of time required to conceive, bear, and parent a child close to maturity, is about .72. The probability of a 20-year-old man surviving 15 more years is also about .72. But for 25-year-old men and women, the probabilities of surviving 15 more years are reduced to .68 and .69 respectively. So young adult women who marry men only five years older than themselves increase the risk of having their children orphaned by the death of their father by 4%. Marriage to a man 10 years older increases the risk by a further 5%.

The pressures exerted by mortality encourage marriage at an early age for both men and women and thus provide an explanation for age homogamy (age can therefore be viewed as a cue for survival potential for both sexes as well as a cue for reproductive potential for women). The pressures exerted by mortality also predict that older adults of both sexes should prefer younger spouses – a tendency that is observed for older men. Because the mortality pressures were probably roughly symmetrical across the sexes (the mortality regimes for men and women were probably more equivalent in historic societies than they are in today's societies), what the mortality pressures do not explain is the current tendency for women to report preferences for and to marry older men. It is noteworthy, however, that the relative frequencies with which hypergamy and hypogamy occur depend strongly on time and place. For example, in the United States around the turn of the century, one in six women was married to a man five or more years her junior, whereas one in 10 was married to a man 10 or more years her junior (Atkinson & Glass 1985). But in 1980 only one in 40 American women was married to a man five or more years her junior and only one in 166 was married to a man 10 or more years her junior. This variance across a short period of time is a reminder that societal norms and expectations, which can change rapidly, strongly influence age-specific patterns of marriage and thus observations pertaining to modern populations need not reflect preferences and behavior in historic populations.

Differential mortality is also an important factor to consider when comparing the number of surviving offspring from the types of age-heterogamous marriages. K & K argue that age-hypogamous marriages, which involve older women and younger men, were less fertile than hypergamous marriages, which involve younger women and older men. But were hypogamous marriages characterized by fewer *surviving* children than hypergamous marriages? At the limit, probably yes. Younger men marrying women old enough to have gone through menopause will obviously have less fertile marriages than older men and younger women. But a sizeable proportion of young adult women do not survive to the age of menopause in high mortality societies. And given the pressures to marry at a younger age, few of the survivors would reach the age of menopause unmarried. As a result, for most historic populations the issue of menopausal sterility was probably moot. So the question concerning the relative numbers of surviving children from hypergamous versus hypogamous marriages is better relegated to marriages involving adults from late adolescence through the thirties. The answer to this question concerning the differential survival of children from hypogamous versus hypergamous marriages then becomes difficult to anticipate. It certainly seems possible that hypergamous marriages were survived by more children than hypogamous marriages but it is also easy to suggest reasons why this may not have been the case. Perhaps children's survival after infancy was more dependent on their father's survival than their mother's survival. Unequivocal support for an evolutionary model as the rationale for age patterns of marriage thus requires considering differential fertility and the differential mortality of children from age-homogamous, hypergamous and hypogamous marriages.

What do men want?

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Although Kenrick & Keefe (K & K) counterpose evolutionary and economic explanations of human mate preferences, evolutionists should find congenial the notion that mating entails social exchange, and social exchange theorists presumably are not Creationists. The essential contrast is one of implicit assumptions about human nature: Social exchange theorists typically assume that the psychological mechanisms underpinning mate preferences are generalized and sexually monomorphic, whereas evolutionists typically assume that at least some (but not necessarily all) of these mechanisms are specialized and sexually dimorphic. The consistency of K & K's data provides some support for the latter assumption.

As K & K note, however, many evolutionists have argued that natural selection designed human males to prefer young females as sexual partners and mates. (K & K also point out that evolutionary expectations about females' age preferences are less clear.) What is novel is K & K's implication that natural selection also designed human males to prefer similar-aged females as mates and that actual mate choices somehow compromise these preferences (among other things). Yet K & K do not really describe the psychological mechanisms – that is, the adaptations – that they believe underpin the hypothesized male preference for similar-aged mates.[1] This is a serious omission, because the goal of the adaptationist program, or teleonomy, is "to recognize certain of [the organism's] features as components of some special problem-solving machinery" (Williams 1985, p. 1).

A preference for similar-aged mates could result from a psychological mechanism that instantiated the rule "prefer mates similar *in general* to yourself" or a mechanism that instantiated the rule "prefer mates similar *in age* to yourself." It is unlikely, however, that selection favored either of these hypothetical mechanisms.

If selection had favored a preference for mates similar in general to oneself (gender excepted), men would prefer masculine women and women would prefer feminine men; diseased and deformed people would perceive as most attractive the similarly afflicted; beautiful women would not tend to marry up, because they would prefer mates of their own socioeconomic statuses; and so forth. Nor is it likely that selection favored a preference for mates similar to oneself genetically. On the contrary, such a preference would to some extent undermine the purpose of sexual reproduction, which is to produce genetically diverse offspring, probably as a defense against pathogens (Tooby 1982). Human inbreeding depression is a well-established phenomenon; human outbreeding depression is not. [Cf. Rushton: "Genetic Similarity" *BBS* 12(3) 1989.]

The existence of positive assortative mating does not necessarily imply that individuals prefer mates similar to themselves. Positive assortment can occur, for example, as an incidental byproduct of psychological mechanisms designed for other purposes. Imagine a monogamous species in which mate choice is underpinned solely by a sexually monomorphic psychological mechanism that instantiates the rule "prefer tallness." The tallest individuals will mate with one another because they want to, the shortest individuals will mate with one another because they have no other choice, assortative mating with respect to height will be perfect, and there will be positive assortment for every characteristic that correlates positively with height (see Sloman & Sloman 1988; Symons 1987). Or consider a human psychological mechanism that generates a template of facial beauty by averaging observed faces (Langlois & Roggman 1990; Symons 1979). Because most people are exposed disproportionately to the faces of their own kin, each person's template is likely to deviate slightly from the population composite in the direction of his own features (Symons 1987), a phenomenon perhaps exacerbated in some recent environments by the evolutionarily novel ubiquity of mirrors. Positive assortative mating that occurs as an incidental byproduct of psychological mechanisms designed for other purposes is more likely to be a selective cost than a benefit.

K & K appear to assume that in the human environment of evolutionary adaptedness (EEA) spousal cooperation was facilitated by age similarity and that selection therefore favored a male preference for similar-aged mates. No evidence or sustained argument is presented to support this assumption, however, and there are reasons, in addition to the ones K & K mention, to expect selection to have favored a male preference for young rather than similar-aged mates. For one thing, among tribal peoples – and by extension among our Pleistocene ancestors – every woman performs essentially similar daily tasks regardless of her age or her husband's age, and a young, strong woman unencumbered by children is likely to perform these tasks most efficiently (Chagnon, personal communication). Furthermore, the survival of a child in the EEA was almost certainly facilitated by its mother's survival, and a female of peak reproductive value would have been less likely than an older female to die before a newborn infant could reach reproductive maturity (Tooby, personal communication). Also, compared to an older female, a female of peak reproductive value would typically have had more living elder kin to invest in her, her children, and her husband (Chagnon 1988).

Male sexual preferences – which everywhere are an important determinant of mate preferences (Symons 1979) – would seem to further undermine K & K's assumption that males were selected to prefer similar-aged mates. If in the EEA the ideal age for a mate increased systematically with male age, it seems reasonable to expect these selective circumstances to be incarnated in male sexual psychology; for example, if the ideal mate for a 45-year-old male was, say, a 30-year-old female, then one would expect selection to have designed 45-year-old males to perceive as maximally sexually attractive those physical characteristics that were diagnostic of 30-year-old females (including the observable sequelae of 12 or 13 years of more or less continuous pregnancy and lactation). After all, nothing in physical or biological law renders smooth skin, wrinkled skin, stretch marks, firm breasts, or pendulous breasts inherently attractive or unattractive: Beauty is in the adaptations of the beholder.

As I noted in a previous commentary in these pages (Symons 1989), Chagnon reports that Yanomamo males prefer newly nubile females as sexual partners and as wives. I know of no reason to suppose the situation to be different among other tribal peoples or to have been different in the human EEA. In that commentary I also predicted that most adult males will perceive as maximally sexually attractive physical characteristics that were reliable cues of peak female reproductive value in the EEA, but that in industrialized societies most older males will *not* prefer to marry newly nubile females. There are many reasons for the latter prediction, three of which are the following: First, most females in industrialized societies maintain a relatively youthful appearance far longer than females did in the EEA.[2]

Second, selection may have favored preferences for *specific kinds* of mate similarity, one of which may be ethnic similarity. In modern industrialized societies, unlike the human EEA, there is so much change in language, dress, manners, values, music, and so forth, from one generation to the next that members of different generations are to some extent members of different cultures. In this evolutionarily novel environment, age dissimilarity may often activate psychological mechanisms that were designed to detect ethnic dissimilarity.

Third, marriage in industrialized societies is in many respects an evolutionarily novel institution (Symons 1985),[3] hence choosing a mate in such societies – like choosing a CEO, a dentist, or a good utility infielder – is an activity without a precise Pleistocene equivalent. Some mate preference criteria (e.g., the preference for a mate with whom one shares common interests) that were irrelevant to mating, or even meaningless, in the EEA may promote marriage between people of similar ages in industrialized societies.

In conclusion, the preferred age for a wife in many evolutionarily novel environments no doubt does increase systematically with male age, but this changing age preference is unlikely to be an adaptation.

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NOTES

1. Statistics on marriage and matrimonial/singles advertisements are highly indirect evidence about the psychological mechanisms underpinning age preferences in mates because these statistics have many determinants in addition to actual age preferences.

2. This point can be made far more convincingly with photographs than with words. I illustrate my lectures on the evolutionary psychology of sexual attractiveness with slides of Yanomamo girls and women from 11 to 45 years of age. In my experience, after viewing these slides every member of the audience intuitively understands the preference of Yanomamo males for 16- to 18-year-old females.

3. Marriages in industrialized Western societies, unlike the EEA, are always monogamous, are normally arranged by the principals rather than by elder kin, are rarely intended to cement alliances among networks of kin, may not involve significant division of labor, may not even be intended to involve child rearing, are rarely necessary for economic survival, and normally require spouses to depend on one another for various kinds of support that, in times past, would have been supplied by kindred.

The preferred age of a potential mate reflects evolved male sexual psychology

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In the target article, Kenrick & Keefe (K & K) join the growing ranks of psychologists who are beginning to use evolutionary theory to inform their models of human social behavior. Furthermore, K & K combine evolutionary logic with social psychological methodology, effecting a powerful treatment of a behavior of enduring human interest, mate choice. These considerations alone make the target article a valuable contribution to the growing literature on empirical evaluation of mate choice criteria. We think the target article would have benefited, however, if the authors had focused on implementing the recent advances in

evolutionary psychology that emphasize the elucidation of behavior through the evaluation of psychological design.

Psychological adaptation must somehow causally underlie all human feelings, emotion, learning, and behavior (see Cosmides & Tooby 1987; Symons 1987). Psychological change (arousal, emotions, learning, etc.) and behavior are the products of the processing of environmental information by psychological mechanisms and psychological mechanisms must somehow reflect psychological structure/design. One domain of the human psyche is the sexual psyche. Aspects of sexual psychology should be designed to process specific information about important events surrounding sexuality (including mate choice). The sexual psychology of men should thus be designed to assess accurately the reproductive capacities of their prospective mates. Given the emphasis men place on health and age of women, this appears to be a good description (Buss 1987; 1989; Symons 1979). Thus, youth should be a constant factor in the criteria of mate choice for men of any age. And much cross-cultural data do seem to support the prediction that men of any age should *often* marry young, reproductive-aged women. For example, in polygynous societies, wives' age at marriage is relatively invariant, but husbands are older with each successive marriage (i.e., as men age, they add wives to their families, each one of whom is the same age at marriage as the last wife was; e.g., Murdock 1949).

If men do have a sexual psychology that is designed to process relevant reproductive information (e.g., age) about a woman, then the most sexually desirable women should be young ones. Indeed, this appears to be empirical fact in all studies that have addressed male sexual preference (Symons 1979; Symons & Ellis 1989; Thornhill & Thornhill 1990, in press). It would surprise us if men over the age of 40 were immune to the sexual desirability of women under the age of 30.

If the above describes male sexual psychology, how can the data in the target article showing male interests to include primarily women who are not much younger than themselves be explained? Male sexual psychology is probably also designed to process information about the probability that the sexuality of any prospective mate can be easily controlled. Control of a mate's sexuality has probably been of major importance to men throughout human evolutionary history because of the implications such control has for paternity reliability. There is some evidence that male sexual psychology includes adaptation specifically designed to process information surrounding sexual coercion (Thornhill & Thornhill 1990; submitted).

With these two interrelated considerations of male sexual psychology, K & K might entertain the following explanations for the patterns in their data:

(1) Evidently, women prefer mates a few years older than themselves, as discussed in the target article. This must constrain a man's ability to attract his otherwise most desired mate as he ages. Given this, an older man who does form a mateship with a woman much younger than himself is probably not her most desired mate. This inequity in the "market value" of the two individuals might cause the man in such mateships constantly to question his ability to control the sexuality of his mate (including infidelity, desertion, etc.; see also Tooby & Cosmides 1990). Such a relationship must be inherently conducive to rather acute male psychological trauma, countering any male tendency to find such a relationship desirable. So, even though young women are more desirable sexually, the costs associated with the pursuit of a relationship with a young woman might begin to outweigh the benefits at some point in male life history.

(2) As pointed out by K & K, as men age, they are progressively more likely to die. The authors quite reasonably suggest that this may explain why women are not so interested in older men. From the male perspective, a reproductive relationship with a much younger woman may end in his death, leaving her to remate, perhaps using his resources in ways not conducive to his interests and perhaps endangering the well-being of his children. A young woman married to a much older man is likely (through the mate's death) to engage in another mateship. If children result from the mateship with the older man, these children are later placed in the potentially dangerous stepfather home (see Daly & Wilson, 1988, for discussion of child abuse by stepfathers). This would be a situation most men would be anxious for their children to avoid. Furthermore, after his death, a man's resources are often (at least partly) controlled by his wife, who might use them in her own interests, which may not be congruent with those of her first mate (especially if she remates). Older men mated to younger women would seem to be at greater risk of such misdirection of resources given that their much younger wives are likely to remate.

For these two reasons men might facultatively change their perspectives on the most desirable age of a potential mate. The above considerations about male sexual psychology suggest some predictions about preferred age of mates for men. First, when men are wealthy and powerful enough to be able to manifestly control their mates' sexuality, then no matter what their age, their preferred mates should be young women of peak reproductive age. Second, when social systems are such that wives remain among their husbands' kin (who will protect the man's interests) after marriage and even after their husbands' death, then men should desire young, peak reproductive-aged women as mates, regardless of male age. Third, when men are wealthy but unable effectively to control the sexuality of their mates (because they are not wealthy enough or have no kin around) young, peak reproductive-aged women should be less desirable as mates as men age.

Measuring the magnitude of sex differences

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Kenrick & Keefe's (K & K's) article makes a valuable contribution to the study of mate selection. Their argument uses the principles of independent but convergent lines of evidence and analyses of cross-cultural and historical materials imaginatively and cogently. My comments are merely intended to clarify some points that might prove useful in interpreting K & K's results. The following bodies of evidence support the view that, although they are strong, the sex differences in age preferences in K & K's data represent a compromise with ideal preferences; consequently they understate differences in sexual psychology.

(1) In species in which males invest significantly in their offspring, the best mate for females tends to be the one that offers the highest quality investment; even in predominantly monogamous species, males are more likely than females to attempt to copulate with additional partners by spreading their investments (Symons 1979; Trivers 1972). Among human beings, paternal investment can take the form of material resources, protection, time, and nurturance devoted to women and their offspring. In contemporary Western society, such words as *love* and *commitment* serve as vernacular euphemisms for *investment:* Consciously or unconsciously, women tend to trade sexual access for investment whereas men trade investment for female sexuality and beauty (Denney et al. 1984; Townsend 1987; 1989; Townsend & Levy 1990a; 1990b). A corollary of this principle is that basic sex differences in sexuality are compromised in heterosexual relations (Symons 1979). Heterosexuals' fantasies, dissatisfactions, and ideal preferences tend to reveal stronger sex differences than do statistics on actual sexual behavior (Ellis & Symons 1990; Symons & Ellis 1989; Townsend 1987; 1989).

A primary function of marriage has been to secure male investment in a woman and her offspring because this has always

been more problematic for the community than inducing a woman to invest in her offspring (Davis 1985; Symons 1979; 1985). Monogamous marriage can represent the ultimate in male investment and hence the ultimate compromise of male sexual fantasies and impulses (Ellis & Symons 1990; Symons 1979; 1985; Townsend 1987; Townsend & Levy 1990b). Consequently, marriage statistics and matrimonial advertisements are likely to compromise what the sexes would ideally prefer. Even ads for more nebulous *relationships* (also a euphemism) among heterosexuals are likely to understate what the advertisers would ideally prefer and overstate what they have to offer. Ads like the following fictions are not likely to receive many serious, positive responses:

— Horny, insensitive, lower-middle-class male seeks gorgeous, lustful female for low-investment copulations with no strings attached.

— Homely, sexually indifferent female seeks fabulously rich, romantic male who will be absolutely devoted to her and her children.

(2) When K & K describe women's preferences as unvarying and men's as varying, they are using the preferred age *difference* between spouses as their reference point. Although it is not invalid, this characterization obscures the fact that the actual ages of women's preferred partners are varying a great deal more than the preferred ages of men's partners. The empirical and clinical literature on the development of sexual orientation, gender transposition, and the paraphilias suggests that in prepuberty, boys, more than girls, internalize, in a process resembling imprinting, the physical attributes of a class of sex objects. These physical attributes act as visual stimuli for sexual arousal during and following puberty (Pillard & Weinrich 1987; Weinrich 1988). Once internalized, these attributes are relatively inflexible, for example, it is difficult if not impossible to induce heterosexual men to be aroused by males' bodies, or gay males by women's bodies, or even to convert "breast men" to "leg men." In comparison, females tend to be more flexible about the physical attributes of partners. The mere sight of these attributes does not produce sexual arousal, and females, both gay and straight, place more emphasis on partners' willingness and ability to invest (Barlow et al. 1973; Bell & Weinberg 1978; Green 1987; Money 1980; Pillard & Weinrich 1987; Stoller 1982; Symons 1979; Townsend n.d.; Weinrich 1988). K & K's finding that men's age preferences are less variable than women's is consistent with this analysis. That men's physical standards for mates are relatively stable after puberty is also supported by the tastes expressed in men's magazines. *Playboy* and *Penthouse* do not have special editions for older men featuring older women. If a market existed for such depictions, surely some entrepreneur would fill the gap.

(3) Having a wife or otherwise public partner who is more similar in age and socioeconomic status (SES) offers powerful men significant advantages: greater social acceptance, companionship, lower necessity for prenuptial agreements and property settlements, and perhaps less demanding partners. But powerful men who have such public partners may also have access to mistresses, girlfriends, or call girls. In terms of age and physical attractiveness, we would expect these less public partners to fall somewhere between the figures in the men's sexual fantasies and magazines on the one end, and their official partners on the other. Hence, with the possible exception of call girls, who are specifically paid to fulfill fantasies, even lower investment relationships with these less public partners represent compromises of basic fantasies and impulses.

(4) A test of the preceding thesis would involve examining the preferences of powerful men in societies that allowed them ample opportunity and few costs for indulging their tastes. The available literature suggests that in such societies only the most powerful men can afford to be polygynous and they tend to prefer newly nubile women as wives and concubines -- young virgins typically being "worth more" (Betzig 1982; Daly & Wilson 1983; Symons 1979). These preferences appear even in ethnographic accounts written with a bias *against* the notion of universal sex differences in sexuality (Mead 1928; 1935). Compared to data from these "less developed" societies, K & K's data and Glenn's reanalysis (1989) of Buss's cross-cultural data (1989) support the thesis that women's increasing SES (socioeconomic status) in contemporary Western nations tends to reduce differences in spousal ages. Observing this effect in the American marriage market, K & K state that "most men in their 60s are simply not in a position to demand women who are several decades younger." Increasing women's SES has evidently allowed women to be choosier in selecting and rejecting mates (Bernard 1979; Blumstein & Schwartz 1983; Udry 1981). But the lower rates of marriage and remarriage and the higher rates of childlessness among higher status women also suggest that there is a growing pool of women whose socioeconomic standards for mates exceed what their age and physical attractiveness merit on the current dating-mating market (Bloom & Trussel 1982; Blumstein & Schwartz 1983; Goldman et al. 1984; Townsend 1987; 1989).

Wanting and getting ain't the same

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What Kenrick & Keefe (K & K) gave us is not so much an account of age preferences in mates as an account of what mates people either get or hope to get. Even matrimonial or personal advertisements are not an accurate reflection of preferences under a fitness maximization model, but of best realistic expectations, given the constraints of the mating market. Obviously, if you place such an ad in an American newspaper as "Rich male octogenarian seeks 13-year-old virgin," you are not only likely to draw a blank but to get the morals squad to investigate you.

The ideal data to test preferences are those drawn from mating systems that are free of constraints on the mating choices of either males or females. In a heterosexual mating market, simultaneous freedom of constraints for both sexes is impossible because the choices of one sex constrain the choices of the other. There are many human mating systems, however, in which there is great asymmetry of freedom of choice, overwhelmingly in favor of males, especially older males controlling economic and political resources.

Before getting to the substance of K & K's analysis, we must introduce two conceptual refinements. The first, stressed long ago by Symons (1979, p. 189), is the distinction between the *reproductive value* of a female to a male, which peaks immediately after menarche, and her *fecundity*, which, in the human case, lags behind menarche and peaks in late teens to mid-20s. Male choice of age of female mates should be a function of the type of prospective male reproductive effort. Where short-time mating effort swamps long-term parental effort, males, irrespective of their own age, should go for women at the peak of their fecundity, irrespective of parity. Conversely, if the male is in for the long haul, he should go for nulliparous nymphets. Male choice of female age (and parity status) should not be a function of male age, but of anticipated type of male reproductive effort.

Such results as K & K report are probably an artifact of the correlation between male age and type of reproductive effort. Adolescent boys can be expected to prefer women older than themselves because their reproductive effort consists almost purely of mating. Their current parental investment prospects are near zero. As such, they are not very attractive as long-term mates to females of any age, and therefore, horny as they are, they cannot afford to be very choosy if they are going to mate at all; but, given an unconstrained choice, they can be expected to go for the *Playboy* centerfold type, as would a male of any age if he is primarily interested in mating. The fact that older males

progressively increase their *stated* preference for age of female as they themselves age is probably simply a function of their coming to terms with the reality of a mating market heavily constrained by female choice, prescriptive monogamy, legal age restrictions, prospects of infidelity, the stigma of culturally defined "lechery," social taboos against having spouses younger than one's children, and so on.

Women, on the other hand, can be predicted to choose long-term mates who not only control resources, but can be expected to invest as much of those resources as possible in their offspring, for as long as possible. On the average, this produces preference for mates older than themselves, but not too much older. For females, too, the main determinant is not absolute or relative age, but relative stress on mating versus parental investment, short-term versus long-term relationships, and amount and reliability of male parental investment. A much younger short-term lover can be quite attractive if he does not threaten the investment of a long-term mate. Conversely, an elderly millionaire with terminal prostate cancer can also be a good prospect if he can be coaxed to change his will. Women settle for older men, not because old age is sexy, but because of the positive correlation between male age and control over resources. Age preference, in female choice as in male choice, is a statistical artifact of association with other more determinative factors. Holding everything else constant, women like their mates as young as men do, but the sexual asymmetry of parental investment dictates very different reproductive strategies for men and women that get expressed in male/female age differentials.

The second key conceptual distinction is the old one between *reproductive* sex ratio and *age-specific* sex ratio. K & K stress the latter, and because their data are drawn from overwhelmingly monogamous societies (*de jure* in the case of the United States and Europe, *de facto* for the vast majority in the case of India and the Philippines), the distinction is of limited practical consequence. Given the two or three year male/female difference in maturation time (sexual bimaturism) characteristic of our species, however, the male/female reproductive sex ratio has to be somewhat lower than the age-specific one, even in prescriptively monogamous systems.

Obviously, our sexual bimaturism (and the sexual dimorphism in size, strength and musculature that accompanies it) is indicative of an evolutionary past of moderate polygyny. Equally obviously, the more polygyny is found in a given society, the lower the male/female reproductive sex ratio, and the greater the *mean* age difference between mates. Sexual bimaturism should be looked at as imposing an upper limit of <1 on the reproductive sex ratio, quite independently of the depressing effect of higher mortality rates at all ages on the *age-specific* sex ratio.

Let us now come to the problem of testing hypotheses of age preferences in mates. There is an inherent difficulty in studying heterosexuality, namely, that whatever matings take place, barring rape, represent a compromise between male and female preferences. That is, the preferences of one sex act as a constraint on the preferences of the other. Therefore, homosexuality, paradoxical as it may seem, is probably a more fertile field for testing evolutionarily grounded hypotheses on mate preferences, a point also made by Symons (1979, p. 304; See also *BBS* multiple book review of *The Evolution of Human Sexuality*" *BBS* 3(2) 1980). Of the heterosexual mating systems, the best ones to study are the ones in which mate choices are least constrained by restrictions on plural marriage, on age of marriage, marriageable categories, and sex in general. Although no society is sexually unconstrained, the Western data in five of the six cases presented by K & K deviate starkly from the evolutionary past in that they are prescriptively monogamous and criminalize sexual relations between adults and adolescents. Both of these constraints put a serious damper on the expression of age preferences in mates, especially for men.

There is, however, a type of society where *male* preferences are relatively unconstrained, at least as to age. Those are polygynous, patrilineal, virilocal societies, mostly of tropical pastoralists and horticulturalists, that often practice marriage by bridewealth (Betzig 1986; Chagnon 1967; 1974; Draper 1989; Evans-Pritchard 1940; Fortes 1949; Goldschmidt 1969; Goody & Tambiah 1973; Irons 1975; Murdock 1959; Nadel 1942; Radcliffe-Brown & Forde 1950). In societies of this type, many, sometimes most, of the men over 40 or 45 are polygynous, and they become so by serially marrying at several years' intervals, young girls who are progressively younger than themselves, so that, by the end of their lives, some of their children are sometimes younger than some of their grandchildren.

Such high incidences of polygyny are sustainable only through a large mean age difference between husbands and wives, and delayed marriage for younger men. Basically, the older men control the political and economic resources and use them to corner the market on nubile girls. Young men, for their part, have to content themselves with fleeting affairs with unmarried girls, sneaking copulations with their elders' wives, raping and kidnapping women from other groups in warfare (and frequently getting killed in the process, thus further improving the reproductive sex ratio for the surviving older men who are past fighting age), or waiting to inherit older brothers' widows through a levirate arrangement. Raiding procures not only women but also livestock to be used in bridewealth. Young men thus have to engage in relatively risky strategies to acquire women and wealth through warfare, but the survivors are almost assured a happily polygynous retirement.

In those societies, men, irrespective of age, clearly prefer pubescent girls, and the value of women (expressed in bridewealth or bride service) declines with age, that is, is principally a function of remaining reproductive value (although social status considerations of both groom and bride and their relatedness sometimes also affects bridewealth). Those are societies especially suitable to investigate male age preferences for mates. At least three such mating systems, that of the Kipsigis of Kenya, the Yanomamö of Venezuela, and the Yomut Turkmen of Iran, have been studied from an evolutionary perspective (Betzig et al. 1988; Borgerhoff Mulder 1988; Chagnon 1967; 1974; Chagnon & Irons 1979; Irons 1975). Many more need to be looked at closely, as they probably best approximate a system of unconstrained male preferences for age of mates. Unfortunately, I cannot think of a similarly constrained system of female preferences.

Accounting for age preferences in sexual selection

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Kenrick & Keefe (K & K) propose the use of life history theory to interpret the age preference pattern in human mate choice. Females apparently tend to choose males that are slightly older than themselves, whereas males prefer increasingly younger partners with increasing age. This is claimed as the predicted response to decreasing reproductive value of women and increasing resource acquisition in men with increasing age. Is it really? The target article does not show the precise and completely documented links among these phenomena that life history theory allows. There are other age preference patterns that could be equally well explained starting from the same premises, whereas different sets of premises could be used to generate the same pattern.

Life history theory tells us that depending on the properties of organisms and their environments rather different routes may

lead to a maximum number of grandchildren, as an approximation of high fitness. An interesting problem in life history relates to the observation that the production of more offspring becomes counterproductive above a certain number, because more newborns will lead to fewer offspring surviving to their own reproductive age. This depends on the quantitative effects of diluted parental care and the extent to which offspring survival before and after independence varies their condition. In fact, it would be very surprising if the physiological age limits to reproduction of human males and females played a major role in determining offspring number and fitness. A late onset of reproduction leading to more offspring in a lifetime is common in animals and quite conceivable in humans.

By relating life history theory to mate preferences one seeks an evolutionary explanation for existing preference patterns. Although potentially rewarding, this is not easy. For one, we don't know enough about the ecology and thus about the selection pressures under which humans lived since diverging from their closest relatives. It makes an enormous difference when the pool of potential mates grew from a few individuals to a few hundred or more through increases in population density, in the size of social groups and in mobility. This raises an important side issue: Given genetic variation in mate preferences, the actual pattern will reflect the conditions over the last 20 generations or so if selection is strong. If selection is weak, however, the actual pattern will reflect conditions over a much longer period.

In addition, mate choice has always been used by evolutionary biologists to explain funny and outrageous traits. They call it sexual selection, and the implicit assumption is that females choose males either directly, based on some aspects of their appearance or resources, or indirectly when the male has won contests with other males. The peacock's tail is believed to have been selected for by a female preference for it. Mate choice is thus an area, par excellence, where evolutionary biology including life history theory has mainly consisted of demonstrating that funny unexplained preferences may quickly lead to outrageous results. It is significant that Darwin (1874) treated human evolution and sexual selection together.

Should the fact that evolutionary biologists use unexplained mate preferences as a mechanism inhibit us from turning the card over and using selection forces to explain the preference patterns? No, but it pays to be careful. A number of studies have shown in a number of different species that females may have strong preferences for experimentally constructed traits that the species has never had in its evolutionary history (Basolo 1990; Ryan et al. 1990; Shykoff 1991).

(1) It is crucial to have an appropriate null hypothesis. Defining the pool of potential mates is a first step. Not explicitly defining the pool of potential partners has led to much confusion in discussions of incest avoidance. For example, it was thus possible to document that Great Tits (*Parus major*) mate at random with respect to relatedness (van Tienderen & van Noordwijk 1988). The pool of potential mates may have fuzzy boundaries in that some individuals search longer and more widely than others. Mate pools may differ depending on age; compare the age structure of mating arenas such as discos or advertisements. Both registered marriages and advertisements are incomplete and possibly unbalanced and unrepresentative samples of the total population.

(2) We will not quibble about the statistical summaries that are hard to reconstruct. What is important in considering the effect of selection is the actual number of pairs. If, for example, 90% of the pairs are formed below 30, those above 30 are (at best) marginally relevant. Furthermore, weighting pairs by number of offspring produced will reflect the number of genes brought into the next generation.

(3) Careful documentation of selection pressures is required. We strongly doubt that until very recently a majority of males increased their resource acquisition ability above the age of 30. Moreover, those males for whom physical capabilities were less important were largely already well situated at lower ages.

(4) One of the great advantages of using life history arguments in explaining mate preferences is that it offers a framework for using data from other species. Especially species that are systematically distant, but similar in life history, may prove very helpful in discriminating life history effects from phylogenetic inertia. In the target article it is suggested that an increase in resource acquisition ability of males is the ultimate reason for female age preferences. In a study of the pied flycatcher (*Ficedula hypoleuca*) it could be demonstrated that females choose territories rather than the male occupants (e.g., Alatalo et al. 1986). the biology of this species with some resource-based polygyny (Orians 1969) generates an observed pattern of mated males being on average older than their female partners. In an experiment females proved perfectly willing to choose young males provided they held better territories, however. Because females choose resources guarded by males, the level of polygyny depends on the variance in territory quality. Large harems and many unmated males are expected when the variance in resources is great. Thus communism is the road to monogamy.

Conclusion. We heartily concur that life history arguments might be helpful in explaining preference patterns. Exploring the variance is likely to prove more helpful than considering mean values. The selection pressures acting now and in the relevant past should be better specified, both quantitatively and with respect to their dependence on the (social) environment. It may well turn out that apparent age preferences are secondary consequences of other preferences. Age is apparently used in some human cultures as a handy descriptor but may otherwise be irrelevant as a mate choice criterion.

Evolutionary hypothesis testing: Consistency is not enough

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A previous *BBS* target article that offered an evolutionary explanation for aspects of human mate preferences (Buss 1989) demonstrated the difficulties in developing solid evolutionary explanations for human social behavior. A successful evolutionary explanation should meet five criteria. First, the evolutionary argument must be described in sufficient detail to allow assessment of which data would confirm or falsify it. Second, nonevolutionary explanations need to be sufficiently developed to similarly assess the fit between the data and alternative explanations. Third, the data to be explained should be analyzed in sufficient detail to allow competing explanations to be tested. Fourth, the data must be consistent with the evolutionary explanation. Fifth, an effect on reproduction (potential or realized) of the variable under study should be demonstrated. Evolutionary explanations require more than consistency between an evolutionary hypothesis and part of a set of data. Kenrick & Keefe (K & K) carefully describe an evolutionary explanation for age-related changes in the age of marriage partners and contrast it to a social exchange theory explanation. They then demonstrate that one aspect of their data is consistent with their evolutionary argument. They do not meet the other requirements for a satisfactory evolutionary explanation, however.

K & K argue that social exchange models cannot account for their reported gender differences in preferred age and that an evolutionary explanation is crucial to understanding life-span age preferences for males and females, stating: "A consideration of lifespan changes in residual reproductive value (Fisher 1930)

leads to a prediction [concerning age preferences for mates] that would not follow from the social exchange models." Two questions are raised by this statement. First, does social exchange theory suggest predictions different from an evolutionary explanation? Second, does K & K's evolutionary explanation depend upon a consideration of residual reproductive value? The answer to both of these questions appears to be no.

As K & K show, social exchange models can account for age-related changes in mate preference if one considers differences in the importance to males and females of physical attractiveness and economic success in selecting mates. In our society, K & K argue, female attractiveness is of more importance in attracting males whereas male economic success is more important in attracting females. This difference in the relative importance of physical attractiveness to women and economic success to men would predict life-span changes in the ideal spousal age compatible with K & K's data. Thus, a social exchange model that considers attractiveness and economic success as modes of exchange would predict results similar to those predicted by the evolutionary explanation. Unfortunately, K & K eliminate the social exchange explanation by suggesting that it applies only to *our society* (which I suspect means Western industrialized society) because the social psychologists who developed this version of social exchange theory limited their discussion to our society. No data are presented, however, showing that the importance of physical attractiveness and wealth differs substantially across cultures. Evidence of a society where males showed a life-span preference for women younger than themselves, but where female attractiveness was not highly valued, would argue strongly against the social exchange explanation, yet such evidence is not presented. That social psychologists have limited their discussions to our society does not mean it is not applicable to other cultures. In the absence of any cross-cultural data the social exchange model cannot be rejected as an explanation of gender differences in age preference. Thus K & K have failed to demonstrate that the evolutionary hypothesis makes different predictions from a social psychological explanation.

K & K also fail to demonstrate that their data fully support their evolutionary argument. The data they present on age differential between mates (or desired mates) are consistent with an evolutionary explanation based upon different male and female mating strategies. An evolutionary argument must demonstrate a mechanism for differential reproduction, however, so selection can operate on the trait under consideration. Because the ultimate test of an evolutionary hypothesis is its effect on reproduction, data on factors that influence reproductive success are the most critical test of an evolutionary hypothesis. In the target article the critical data are the absolute age of the female spouse, not the age differentials between spouses as focused on by K & K. Because females have a significantly shorter period of fertility than males, the age of the female spouse is a limiting factor in a couple's reproductive success. When the probable age of female spouses is derived from K & K's data, the results contradict an evolutionary argument and certainly don't provide evidence of "general population preferences that translate into reproductive behavior."

As K & K note, males marry progressively younger females as they age even though the female spouse's absolute age increases. Therein lies the problem for the authors' evolutionary explanation. Although older males prefer women younger than themselves, these females are often past their reproductive prime or are postmenopausal. Figure 1 illustrates K & K's data on marriages in Seattle recalculated to reflect the actual median age of spouses, instead of differences in age. The dotted lines encompass the principal period of female fecundity. A much narrower band, from 20 to 30 years of age, would reflect the female's peak period of fertility. An evolutionary explanation invoking residual reproductive value would predict that the line for the age of female partners in relation to male age would be parallel to and lie within the dotted lines on the figure. Instead,

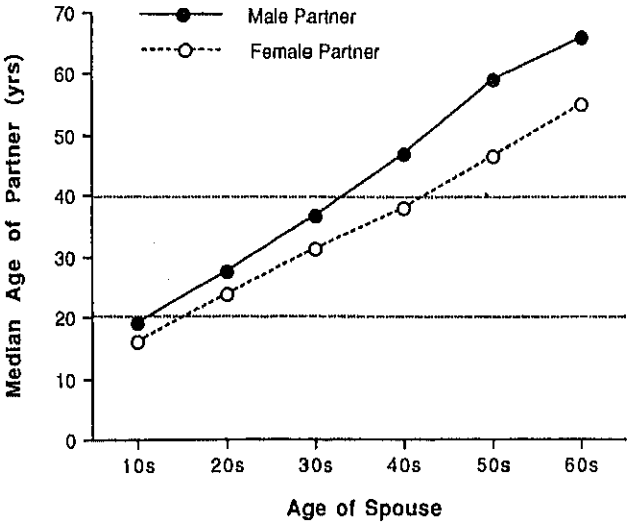

Figure 1 (Wallen). Median ages of marriage partners for male and female spouses of various ages. Data from Kenrick & Keefe's data on 753 Seattle, WA, marriages in 1986. Dotted lines represent the principal period of female fecundity.

the data show a markedly different pattern strongly suggesting that males are selecting mates on some attribute other than reproductive potential. Thus, whereas one measure in K & K's data is consistent with their hypothesis, another measure contradicts it in one crucial aspect: The males don't appear to be maximizing reproductive potential in their selection of partners.

As Kenrick & Keefe state, understanding human mate preferences requires understanding multiple influences on the development and expression of human behavior. It will certainly be demonstrated that human evolutionary history influences all aspects of human behavior. To understand the magnitude of evolutionary influences, however, requires developing a critical methodology for presenting and evaluating evolutionary hypotheses. Consistency is not enough.

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Authors' Response

Sex differences in age preference: Universal reality or ephemeral construction?

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The first great Western academic tradition began in 387 B.C. at Plato's Academy at Athens, where scholars learned through Socrates' dialectic method – searching for constancies through open argumentation (Stumpf 1986). The second tradition is the scientific journal, which, at its inception in 1665, was devoted to the letters arriving at the British Royal Society from scientists

around the world (Boorstin 1983). After reading through the many perspectives provided by commentators from a wide range of disciplines and nations, we are convinced that open peer commentary combines the best of both these traditions. Our response begins at the Socratic heart of the matter: Given these diverse perspectives on the data and theory we presented, is there anything about which we can all agree? We believe there is solid reason to agree on the empirical phenomenon itself, although some commentators suggest that we have underestimated its magnitude. We also consider several comments about data from nonhuman species which, by themselves, prove to have limited relevance. We then consider the major explanatory questions raised by the commentators: Did our ancestors live long enough for age preferences to make a difference? Why do older men marry postreproductive women? What are the mechanisms underlying male choice of relatively youthful females, female choice of older males, and both sexes' attraction to similar-age partners? After considering these and other empirically testable questions, we consider two larger epistomological issues raised by several reviewers. Do social psychology and evolutionary biology represent mutually exclusive levels of analysis? Are scientific theories merely political/historical constructions? We conclude that the Darwinian construction holds up well against the elements of reality.

Can we agree on the empirical phenomenon?

There is near consensus that the empirical phenomenon, or at least some aspects of it, is a real one. The particular aspect about which there seems to be most agreement is that men's and women's preferences do indeed differ in more or less the pattern we describe. Several reviewers even suggested that we may have underestimated the degree of those differences (e.g., **Symons, Thornhill & Thornhill, Townsend, van den Berghe**). Because this empirical gender difference is the most important aspect of the target article, let us first address the few holdouts on consensus.

Several commentators expressed some reservations about the validity of mate advertisements (**Bayer, Dupré, van Noordwijk & Shykoff**). As we pointed out in the target article, these advertisements have severe potential limitations as a sole source of data. On the other hand, **Rajecki & Rasmussen** argue that the very limitations on singles advertisements, in the context of the other verifications, lend support to the robustness of the phenomenon. It is important to note that any data set has limitations and it is generally an error to assume that one can prove or disprove a hypothesis with any single source of data. As McGrath (1982) has argued quite cogently, the only way to resolve the problem of the inherent limitations on every empirical method is to triangulate – to examine the phenomenon with numerous methods, each with strengths that compensate for the others' weaknesses. When numerous data sets converge on the same conclusion, the researcher is in the position of a detective who has evidence from several imperfect witnesses. The deaf woman, the blind man, the emotionally distraught spouse of the murder victim, and the dimwitted child are all, in themselves, dubitable sources of evidence. Nevertheless, if from each of their fuzzy vantage points, they all agree that the butler did it, we should suspect that the butler did indeed do it. As we describe below, there are other witnesses to be brought to bear on the case presented in the target article.

Of course, it is possible that all sources of evidence suffer from a similar bias. If all the witnesses to a crime are hard of hearing, if the evidence is an overheard conversation, and if the detective knows they all got together to discuss the evidence before he interviewed them, there is good reason for skepticism. In arguing that few of the data we present are "truly cross-cultural," **Levinger & Kirkpatrick** are suggesting the similar-bias problem. They do acknowledge the Philippine and Indian data, but they seem to focus more on possible differences of magnitude than on the overwhelming similarity of pattern. More important, they argue that a much larger sample of cultures would be necessary to convince them. In addressing their concern, it is worth bringing up **Dewsbury's** question about whether we have presented the complete catalogue of our findings. Certainly, if we had exhaustively scanned the cross-cultural data on marriage and mating advertisements it would prove nothing that we found two cultures similar in pattern to the United States. As Dewsbury suspects, however, we have presented all the data we collected, and that is an important point. The data in the target article may well be seen to be a random sample of data sets convenient to us. We chose Phoenix to collect advertisements because we live there, Seattle because the second author summers there, the Philippines because the second author's wife has relatives on Poro, and India because one of our colleagues who had heard about our research picked up a newspaper during a visit there. When such divergent and unsystematically selected data sets converge so neatly on the same pattern, one can be relatively confident that the phenomenon will be found in other samples and places. And indeed it is, as suggested indirectly in the target article, and directly in several other data sets described by the commentators.

The indirect, but relevant, evidence presented in the target article is found in Table 2. There we present the marriage age ratios from disparate cultures in Mauritius, Cuba, Singapore, Malta, and Fiji. The fact that all show the same skewed marriage ratios suggests the same sex differences found in the data sets we analyzed more completely. Let us repeat that those places were not chosen by looking at the data, but simply by choosing geographically disparate locales. Skeptics are encouraged to consult the same source and examine as many other cultures as is necessary to still their skepticism.

Even more direct evidence is provided by the commenators, however. **Grammer** corroborates the pattern in a sample of 1,048 females and 1,590 males who participated in a German computer dating service. This supports our own German data, though admittedly it does not provide a sample that **Levinger & Kirkpatrick** would consider truly cross-cultural. That is provided by **Harpending**, who begins by raising the same question as Levinger & Kirkpartick, then answers it with very interesting data from an African pastoralist group in which there is very low male investment. As Harpending notes, our pattern is exactly replicated. Going further, **Broude** provides data from 47 traditional cultures. Dividing them into those in which men marry in their teens, 20s, and

30s, she finds a steadily increasing difference between men's age and the ages of their partners. The final corroboration is provided by **Schoen**, who tells us that the pattern is one that several experts on population dynamics have described before. We are actually not surprised, given the robustness of the pattern and the fact that marriage data have been so thoroughly analyzed. What is surprising is that, in a cursory examination of the sources cited by Schoen, we find little evidence that the sex difference was either well described or well explained. For instance, an article entitled "The variation with age of age differences in marriage" included a table of all 1976 marriages in England and Wales (Bytheway 1981). The table indicates the pattern, but the author largely ignores it in favor of a discussion of other minor discontinuities in the data. Bytheway (1981) makes no mention of the possible reproductive significance of the sex difference, but focuses instead on people's hypothesized motivation to "gain the appearance of a couple who had married at the usual age" (pp. 926–927). Pressor (1975) likewise alludes to the age difference, but offers a tentative explanation in terms of the "norm" that ". . . a husband should be, or at least appear to be, mentally and physically superior to his wife. Not only should he be taller than she (for the appearance of superiority) but also older (which gives him the advantage of more time to become better educated and more experienced)" (p. 202).

Such an explanation is similar to the social psychological normative models we described in the target article. The postulated single normative mechanism does not explain the change in age discrepancy over the life span. It is noteworthy that social psychologists who have examined the literature on population dynamics show little evidence of having encoded the pattern.

Note that the robustness of this empirical phenomenon is not trivial. As the quotes from social scientists included in the target article illustrate, this reliable sex difference and the issue of reproductive potential have been ignored by social psychologists (**Levinger**, who is a prominent contributor to the social psychological literature on relationships, also acknowledges this).

Although he does not argue with the general pattern of the data, **Schoen** suggests that no data pattern could have falsified or verified our model. It could have been the case, however, that women preferred younger men in other societies, or that men preferred markedly older women. A reversed pattern for the two sexes is one simple example of an empirical finding that would have dealt a quick death blow to our evolutionary model. We assume therefore that Schoen was referring to the possibility of distinguishing purely cultural from evolved biological mechanisms. This is also incorrect, but we discuss it below.

Did we underestimate the sex difference? Several of the anthropologists (**Broude, Symons, Thornhill & Thornhill, Townsend, van den Berghe**) suggest that the data underestimate the sex difference, at least as a description of preferences in hunter-gatherer societies (see also **Stephan**). Symons describes a series of photographs of Yanomamo women that, he says, illustrates his point that women in hunter-gatherer cultures age much more rapidly in contrast to women in modern societies. Thornhill and Thornhill as well as Townsend both affirm Symons's point that men in traditional polygynous societies prefer nubile wives, regardless of the man's age at marriage. The data Broude presents from 57 traditional cultures seem to bear out a preference for significantly younger partners in those societies. **Harpending** says he finds our pattern in data from an African pastoralist group, except that the age difference is greater. In the target article, we suggested that, in agreement with **Glenn's** commentaries here and in response to Buss (*BBS* 1989), the sex difference would be stronger in traditional cultures. It would be interesting to see an extensive data collection on age differences at marriage in traditional and nontraditional cultures, with particular attention to expected offspring survival, expected relationship longevity, and such other possible mediating variables as those we discussed in the target article.

It is important to note that the models advanced by evolutionary theorists have not previously been supported by extensive data, they have not extensively considered female age choices, and they have not fully considered the age changes over the life span. Thus, the data we present from Western societies raise new questions not only for social psychologists, but for evolutionary theorists as well.

What about preferences for older females in other species? Although none of the commentators presented human data that were out of line with the pattern described here, two mention instances in which males in other species show a preference for "older" females (**Byrne & Kelley, Moffatt & Nelson**). There are several problems with selecting particular behaviors in particular species to make an argument about general mechanisms (**Levinger & Kirkpatrick** do the same in citing evidence that supposedly goes against the generalization that female mammals mate preferentially with dominant males). The proper use of the comparative behavioral method involves comparing a large number of species that vary along particular phylogenetic, ecological, or morphological dimensions, and then examining covariation along behavioral dimensions. A good example is Ralls's (1976) review of mammals in which females are larger than males. Ralls examined every known species in which females were reputedly larger than males and found no evidence that larger female size was associated with greater female dominance, weaponry, or competition for high-investing males. The point is that making comparisons based on only one feature of a species (e.g., size, mating system, habitat, or phylogenetic family) may lead to misleading conclusions. An important lesson of comparative studies is that animals that are closely related often adopt very different behavioral strategies depending on the constraints of their physical and social environments, as Darwin established in his classic studies of Galapagos finches. The fact that other primate species are phylogenetically close to humans does not mean their mating systems are the same. Chimpanzees, for instance, have low male parental investment and do not mate within pair-bonds, two features that would make the reasoning we presented for human males irrelevant to chimpanzee behavior.

Even ignoring these issues, there is a more direct problem with the meaning imputed to the cited findings showing that primate males in some species prefer "older" to younger females. Female reproductive success

does not decrease from birth in a linear fashion; it takes the form of an inverted U-shaped function, first rising with age, then declining (e.g., Clutton-Brock et al. 1982). Would chimpanzees be attracted to females that were *postreproductive?* Probably not. Chimpanzees, like most other mammalian species, do not undergo menopause (Lancaster & King 1985). Because menopause is critical to our arguments about human male choice, the age choices in species in which menopause does not exist are not very relevant.

Questions of explanation

Although showing some consensus that the male pattern is related to interest in female reproductive capacity, our commentators raised several interesting questions about how to explain the data. An important potential problem stems from the fact that most humans in traditional cultures may not have lived past age 40. A related issue is the interest of older males in females who are in, or are approaching, postreproductive years. Other issues concern the mechanisms underlying male preference for relative youth, female preference for relative age, and both sexes' preference for similar-age partners.

Did our ancestors live long enough for age preferences to make a difference? It is suggested by **Stevens** that "for most historic populations the issue of menopausal sterility was moot." A variation of this argument is suggested by **Byrne & Kelley, van Noordwijk & Shykoff, Moffatt & Nelson,** and **Stephan.** If we consider the extreme case in which absolutely none of our ancestors lived more than 30 years, this would pose a severe problem for our assumption that male preferences are based on female fertility. The difference in fertility between a 29- and a 19-year-old woman might not offer a critical evolutionary advantage for differential age preference. In considering this argument, it is very important to distinguish between the average life expectancy and the distribution of expected life-spans (the maximum length of life for individuals). Yin and Shine (1985) note that even gerontologists commonly misunderstand this distinction, and, in so doing, perpetrate a "myth . . . that the human life span has been extended, that in the past people lived 40 to 50 years, and that nowadays about 30 years have been added to the life span." Many humans in traditional groups died in infancy and childhood. An average life span that included their deaths in the calculation would be misleading with regard to our arguments, which apply only to those who have survived to reproductive age. The important question is not "what was the average life expectancy" but "did any humans live past the years of maximal fertility, and if so, what was their reproductive success relative to those who did not?" If only 10% of our ancestors lived past 30, they were not "marginally relevant" (van Noordwijk & Shykoff) if, in living extra years, they reared 10% more successful offspring. Natural selection probably acts on slimmer advantages than that, in most instances. In fact, the total reproductive success of an individual living to 50 years of age could easily be double or triple that of someone who died before age 30.

A review of evidence on the history of human life expectancy suggests, in line with the commentators' reasoning, that life expectancies longer than 50 years are indeed much more common in very recent years (Acsadi & Nemeskeri 1970). That same review, however, also suggests that long life spans are hardly peculiar to modern times, but have been evolving since early hominids. Ancient gravestones in Italy indicate a reasonable number of men and women who lived not only to 40 years of age, but to 50, 60, 70, and even 80 (Acsadi & Nemeskeri 1970, p. 69). Analyses of bones found in earlier gravesites also consistently reveal substantial numbers of individuals surviving past the years of peak fertility. For instance, one gravesite from the Copper Age indicated that 39% of one group living between 2100 and 1900 B.C. survived more than 40 years, and 5% survived more than 50 years. Two Mesolithic sites revealed survival rates of 43% and 75% over age 40, 29% and 51% over 50, and 16% and 20% over age 60. Going further back, Acsadi and Nemeskeri estimate that more than 10% of Neanderthal cave dwellers survived past age 40. Although it is correct to say that most early hominids died before age 40, it is incorrect to assume that there was an insufficient number living past age 30 to have allowed evolutionary pressures on older age preferences. Assume a group in which only two men survive the decade from age 40 to 50, and both take additional wives. If one takes a wife aged 25 and one takes a wife aged 45, the former might have four more offspring and the latter none. Repeating this scenario for several generations begins to yield an important advantage to any genes predisposing a preference for younger women, and that preference will be linked to the genes predisposing longevity.

Why do older men marry postreproductive women? This question has several possible answers. **Broude** suggests one that is related to the arguments about life span in early hominids. She assumes that a mechanism that worked until men reached age 50 would have been selected even if it failed to work after that. It is certainly the case that survival till age 70 was rare in early hominids and thus our argument in the preceding section might only work, and need only work, up until age 50. However, several other possibilities exist. It may be that preferences for older women are based on unusual features of modern industrial society (such as the longer apparent youthfulness of women who do not bear children – **Symons**). It might also be that very much older men simply do the best they can (as suggested by **Thornhill & Thornhill, Townsend,** and **van den Berghe**), but that beyond age 50, most are not able to compete for much younger females. As we suggested in the target article, it is also possible, though not necessary to our overall line of reasoning, that taking any wife (even an older one) promotes the ability of an older male to contribute to the survival of his existing offspring. These issues are returned to in the sections below.

What is the specific mechanism underlying male choice of relatively youthful females? None of the commentators raised a strong objection to the assumption that the variations in the male pattern are driven by a preference for relatively youthful females. There were several questions about exactly how such a mechanism operates. **Alley** suggested that it is the perceived appearance of youth, rather than specific calendar age, that is important. We

agree that perceived rather than actual age is probably a better cue to health and reproductive condition. This is usually correlated with youth, but as **Symons** implies, a nulliparous and athletic 35-year-old woman in a technological society, in comparison to a 25-year-old hunter-gatherer woman who has borne six children, probably appears more healthy and reproductively fit (cognitively coded as "attractive"). Of course, women in modern societies have cosmetic technology and plastic surgery, and these are used to reduce the relationship between actual and apparent age. These points are relevant to **Byrne & Kelley**'s questions about the supposed "anomalies" presented by some older women's marriage to younger men. As we noted in the target article, a partner's age is not the only factor that operates in a search for a mate. However, we expect that among such marriages one would find an exceptional number of women who appear especially healthy and "young looking for their age" (such as the popular actresses named by Byrne & Kelley). As we suggested in the target article, the relative importance of cognitively coded calendar age as compared to physical signs of aging could easily be tested in experimental designs.

Russell suggests that males are attracted to youthful females in part because of perceived status, whereas **Stephan** suggests that younger females are simply more attractive partners for sexual intercourse. Both of these commentators acknowledge that these mechanisms are simply proximate versions of the mechanism for "youth preference." Stephan's assumption is almost a necessary corollary of our explanation (we discuss the relationship between proximate and ultimate explanations in a later section). Regarding Russell's argument about the status value of younger females, however, there is a differential prediction to be made. Social psychological researchers commonly manipulate the publicness versus privateness of behavior. If Russell's speculations were correct, older men given a choice between two sexual partners would be more likely to choose the younger one if they were likely to be seen with her than if they were led to believe that no one else would ever know of their decision. Although it would not be possible to offer actual choices, subjects are quite capable of making distinctions between private "one-night stands" and more public relationships when offered hypothetical choices (Kenrick et al. 1990), and it is also possible to lead subjects to believe that their decisions will never be seen by the researcher.

Several commentators suggested that the subjective intention to reproduce might mediate, or at least moderate, males' preference for relatively youthful females (**Borkenau, Dupré, Mealey**). In the target article, we suggested one way to test such a potential mediator – examine the preferences of men who have had vasectomies. If such men, who have made an explicit decision not to reproduce, still show a preference for relative youth, then conscious intention to reproduce is not necessary to explain male preference for youth. The same logic would hold for men who report that they are not interested in having children, but have not taken surgical steps in that direction. Research on the preferences of homosexuals would also be pertinent here. If homosexual males also prefer youthful male partners, that would argue against the importance of conscious intentions to reproduce. A finding that men with a positive conscious intention to reproduce showed a relatively stronger preference for youthful partners would not rule out the evolutionary explanation. People who have a conscious intention to eat are more likely to go out of their way to seek food, but this does not imply that the conscious process does not have biological underpinnings. It is simply that consciousness is not necessary to the evolutionary models in the same way that it is necessary to the normative models.

Dupré's argument that norms could operate without people's awareness seems to confuse two meanings of the term "norm." A *descriptive norm* is simply a characterization of a population, such as the norms for the number of verbal items scored correctly by 10-year-olds versus 15-year-olds. It is a safe assumption that 10- and 15-year-olds' responses to IQ tests are not driven by their expectations about the Wechsler manuals. A *prescriptive norm*, on the other hand, is a rule or social convention that specifies appropriate behavior. A prescriptive norm cannot operate unless people are aware of its existence. That is why people often act inappropriately in novel cultures or subcultures – they cannot follow rules they do not know about. When social psychologists (like the ones we quoted in the target article) argue that men's and women's age preferences are driven by societal norms (such as that men *should* be more powerful than women), they are making an argument about prescriptive norms. We agree with Dupré that our data do demonstrate the norms for age preference, but they demonstrate only descriptive norms, not prescriptive norms. Again, the very fact that young men often marry older women suggests that a strong prescriptive norm does not operate at either the conscious or unconscious level. And again, the fact that the descriptive norms are so similar across very different cultures strains a prescriptive normative explanation.

What is the mechanism underlying female choice of older males? Several commentators note that our explanation of the female data does not have the power of the explanation for the male data (**Levinger & Kirkpatrick, Simpson, Sloman & Sloman**, and **van den Berghe**). Levinger, Simpson, and Sloman & Sloman all wonder why, if males are attracted to women in their early 20s, there is no parallel ideal attraction age drawing female preferences. We ourselves wondered about this as well. We are inclined to agree with Simpson that female preferences are not the result of a single mechanism, but, as we discussed in the target article, may be the product of two or more factors that operate in opposition (such as declining male health but increasing resources with age). One must no doubt add to this the fact that, as women age, their own "fertility value" decreases, giving them less and less bargaining power. Thus, the preferences of females, more than males, may reflect van den Berghe's claim that "wanting and getting" are not the same. Van den Berghe himself argues that, all else held constant, women would like their mates as young as men do. This is another empirical question, which could be tested in experiments in which females are asked to rate the attractiveness of men whose age is varied independently of normally confounded variables like wealth and social status. **Van Noordwijk & Shykoff** note that naturalistic studies of birds indicate that females are attracted to territories, rather than age, although the two are nor-

mally confounded. Along similar lines, Levinger & Kirkpatrick make the very reasonable suggestion that age in a male is not so attractive as the resources that normally come with age. We agree that the relationship between status and male age is certainly an important, possibly the most important, factor in female choice. However, it is possible that advanced age was itself, in the environment of evolutionary adaptedness, an indication of a male with other adaptive genetic tendencies. If so, age might have some attractiveness independent of resources. In a related vein, **Byrne & Kelley** question whether older males would indeed have held dominant positions in the group. They make an assumption that strength is central to dominance, and draw a comparison with aging athletes. Human dominance is not based solely on aggressive displays, however, but on acquired knowledge, social intelligence, and leadership abilities, all of which may increase with age. The most dominant member of the team is the coach, who is usually an aging athlete.

Regarding **Levinger & Kirkpatrick's** citation of primate research in which male dominance is not strongly correlated with reproductive success, or is correlated only in public rather than private matings, we note the same cautions as earlier about the dangers of selecting specific animal findings as opposed to general trends. We reviewed other findings that are more indicative of the general relationship elsewhere (e.g., Sadalla et al. 1987). Nevertheless, we note again that evolution typically operates on slight advantages that magnify over the evolutionary long haul, so even a small sexual selection pressure favoring male dominance would be important.

Dupré's suggestion that older women may marry less than older men because they "have learned better," and presumably do not want to marry seems to roundly ignore issues like the unfavorable sex ratio faced by older women, but it is easily tested empirically. If he is right, survey data should reveal that older women turn down more marital offers than younger women do.

Byrne & Kelley and **Wallen** both suggest that a culture in which women are more powerful than men would yield a critical test of our assumptions, although they make opposite predictions about what we should find. Byrne & Kelley echo our own assumption that our model would be supported if such a society revealed the same pattern we reported in the target article. Wallen suggests that our model would be supported by the opposite pattern – with females preferring younger men and males preferring older women. We were puzzled by Wallen's prediction, until we realized that she was probably forgetting a rather crucial detail. Male choice of youth is based on youthful females' reproductive capacities. For her reverse prediction to hold, men in the society in question would have to conceive and bear the young! Regarding Byrne & Kelley's suggestion, we reiterate our argument that the data from wealthy women advertising in the *Washingtonian* magazine may be about as close as one is going to get to a society in which women are more powerful than men. As we note, these women certainly have more resources and independence than most men in the world have ever had. Although there is a slight tendency for these women to show a less pronounced preference for older men when they themselves get older, it hardly appears that they wish to trade their resources for youth in the way men do.

What is the explanation of similarity preference? It is clear that males, at least in nontraditional societies, are not simply advertising for, or marrying, women who are at, or about to enter, their years of peak fertility – they are modifying an attraction toward younger females with a pull toward women of an age similar to their own. It is also clear that females are not simply advertising for, or marrying, men who cluster around some equivalent peak age that optimizes dominance, resources, and health (as suggested in the target article, and in comments by **Levinger & Kirkpatrick, Sloman & Sloman,** and **Simpson**). Instead, women demonstrate a general pull toward men who are slightly older than themselves.

A preference for similar age in a mate as an adaptation would, we suspect, have been rooted in a different component of reproductive fitness from the male preference for relative youth or the female preference for relative age, and so we would expect these preferences to be reflected in different psychological mechanisms and to be triggered by separate stimulus properties and circumstances (see **Simpson**). We would speculate that an interest in a mate of similar age is related to the mechanism by which people select and retain friends. One possible trigger for such attraction would be salient cues marking members of the same social "in-group" (e.g., clothing, dance, diet, slang). A related possibility is that instead of keeping a running tally of similar features, people are repelled by any salient cues that mark an individual as a member of an "out-group" (Kenrick 1989a; Rosenbaum 1986). The expression of such a preference might well be facultatively moderated by situational triggers. Attraction in a relatively short, less intimate relationship might be governed overwhelmingly by cues of youthful sexual maturity. In relationships expected to be continuous and exclusive, we would expect increased attraction toward similarity, or any characteristic that helped partners cooperate, protect, and mutually support one another.

Although we mentioned it in the target article, several commentators seemed to miss that our initial expectation of similarity preference was derived from the strong empirical support for such a phenomenon in the social psychological literature. The evolutionary explanation of the (somewhat sex-moderated) empirical similarity phenomenon we observed was indeed post hoc, and tentative. The commentators offered a number of alternative possible explanations, which can be divided into several categories. We first consider the possibility that similarity has no direct appeal, then address several alternative reasons why seeking a similar mate might have benefits.

Perhaps similarity isn't really appealing. A possibility that we mentioned in the target article is reiterated and clarified by **Sloman & Sloman, Symons,** and **Schoen.** If everyone is seeking an extreme on a dimension, those at the extreme will mate with other desirable partners; those near the extreme will mate with other runner-ups, third placers will likewise end up together after all the blue and red ribbons have been taken, and so on down to the booby prize category. If all men are seeking women who are reproductively mature, but relatively young, those men who are most attractive and who command the most resources will end up with the women in that age range. To the extent that the simple economic competi-

tion model does apply, it is important to note that it is not in itself sufficient to describe all of the data, as **Schoen** seems to imply. As we noted in the target article, it is necessary to add new assumptions to explain the male preference for relative youth and the female preference for relative age. **Schoen** and **Mealey** both argue that economic models are completely compatible with the notion that both sexes value different commodities. We agree, but must again note that a simple economic model gives us no clue as to the origins of the sex differences in values, whereas the evolutionary model does. This is not to imply that we believe the models are incompatible. As we noted in the target article, evolutionary models incorporate explicit economic assumptions. We do, however, continue to insist that a pure and simple economic model, unassisted by evolutionary theory, has explanatory deficiencies as a theory of mate choice.

Perhaps the two sexes limit one another. This is a variant of the argument that similarity is not itself appealing, mentioned by **Thornhill & Thornhill, Townsend,** and **van den Berghe.** Each of these commentators assumes that males are interested in young but sexually mature females, but that women's preference for only moderately older men limits this choice. Townsend notes that erotic magazines do not generally feature special versions for older males. We agree with Townsend's observation, but note again the important distinction between long-term and short-term matings (Kenrick et al. 1990). As we suggested in the target article, we would expect that an interest in young maximally fertile partners is most pronounced when the relationship is a low investment short-term arrangement. On the other hand, an interest in similar mates would be expected to operate more in high-investment long-term relationships, where the male expects to make a cooperative parenting investment. There may well be facultative mechanisms involved, as Thornhill & Thornhill suggest. Erotic magazines, with their emphasis on young women with supernormal secondary sexual characteristics, no doubt appeal to fantasies about short-term sexual partners, rather than parental bonding.

Perhaps similarity is rewarding, but not an adaptation. This argument, advanced by **Glenn, Symons, Sloman & Sloman,** and **Stephan,** is closest to our original view. We based our explanation of similarity on social psychological models of reward (see also **Byrne & Kelley**). We developed our speculations about the possible evolutionary significance in response to the suggestions of earlier reviewers, and those speculations were indeed post hoc. However, we would make two points in this regard. It is not quite correct to suggest that a preference for rewarding partners is any less the result of an adaptation than is the male preference for youth. As we noted earlier, and in line with another point made by Symons, the preference for a particular age is probably indirectly related to other adaptive mechanisms, rather than a mechanism that specifies "look for someone who was born 17 to 24 years ago." Preference for rewarding partners is certainly adaptive in some ways, but if this argument is correct, it is the result of the sort of general but nevertheless adaptive mechanism that Symons describes.

The fact that marriages in traditional cultures do involve much younger women marrying older men does support this line of reasoning. Symons notes, however, that women in nontraditional societies do not age nearly as rapidly as women in traditional societies. Thus, there may be a weak preference for similarity in men in both types of societies, which shows up more clearly when the direct physical process of female aging is dampened. In addition, as we noted in the target article, the relative balancing of similarity and preference for youth may depend on facultative mechanisms sensitive to the likelihood of offspring survival, the pool of eligible partners, one's own expected survival, and so on. The argument that similarity is only important in postindustrial societies also fails to explain why females in traditional societies prefer males who are not simply older, but also somewhat similar in age (as in our Philippine data).

Perhaps age preferences are related to a preference for genetic similarity. Contrary to our reasoning in the target article, **Rushton** argues that his genetic similarity theory can encompass our data. He argues that there is indeed evidence that genes are related to the pace of aging. We agree, but continue to hold that those genes are not likely to be an important part of mate selection. A woman who is now 20 may have a choice of three partners, one who is now 21, one who is now 40, and one who is now 19. The 21- and the 40-year-old have already been to age 20, whereas the 19-year-old stands a good chance of being there in a year. If she chooses the 21-year-old, is this is any indication that he is more genetically similar on the gene that controls the pace of aging? Rushton could advance a variant of a life-history argument if he were to argue that people mature at different rates, and those who mature early will marry those who mature early, whereas those who mature late will marry those who mature late. This is an interesting empirical question; however, in the absence of pertinent evidence, we remain doubtful that such a mechanism accounts for the bulk of variance in age similarity.

Perhaps similarity preferences result from intrasexual competition. In the target article, we suggested that older males might be limited in their ability to attract younger females who also have access to younger males. **Thornhill & Thornhill** suggest an interesting variation of this argument in their suggestion that older men may be unable to control the sexuality of young women. They suggest empirical tests of this notion. One is that powerful men should show a stronger preference for women of peak reproductive age than do less powerful men. If one compares the relatively more wealthy men in the Washingtonian sample to the less wealthy men, or if one assumes that all men who advertised in the *Washingtonian* might be relatively well off and one compares them to men in the first data set (Phoenix singles advertisements), there is some suggestion that this may be the case. **Grammer** also reports a greater preference for sexy young partners among divorced higher-income men than among other single and lower-income divorced men. More extensive data collection is needed to address this prediction.

Other empirical questions

There are a number of other potentially testable questions raised by the commentators. Several commentators would like to see evidence that the differential preferences are associated with differential reproductive success (**Bayer, Moffatt & Nelson, Sloman & Sloman, Stevens, Wallen**). Bayer finds the absence of these data "curious," presumably working on a mistaken assumption that differential reproductive success provides the only data relevant to evolutionary hypotheses. Evolutionary hypotheses, like any other hypotheses, are tested with a nomological network of findings that triangulate on the phenomenon in question. We provided the data from the advertisements lending initial support for the hypothesis, verified it with several contemporary archival data sets on actual marriages, and replicated the pattern in several cross-historical and cross-cultural data sets. These data strongly support the existence of a pancultural sex-differentiated selection process consistent with our evolutionary reasoning, and not explained by alternative models. Data on reproductive success are not necessary to assess the relative viability of the hypotheses we advanced. Logic alone suggests that marriages involving women in the years of peak fertility will result in higher reproductive success than marriages involving women who have passed their fertile period. As it turns out, there are some contemporary data relevant to the question of reproductive success. Compared to couples similar in age, couples in which the husband is older have higher fertility, and couples in which the husband is younger have lower fertility (Carter & Glick 1976; Presser 1975). These data would seem to bear out the reproductive implications of the preferences we describe in the target article, and further investigations that included numbers of grandchildren would contribute to the relevant nomological net. However, caution is necessary in interpreting these types of data. Symons (1989) has cogently elaborated the flaws in the belief that contemporary reproductive patterns are the only, or even the best, test of any evolutionary hypothesis (see Crawford's commentary on primary and secondary predictions and **Moffatt & Nelson**'s caution for discussions of related issues).

Borkenau makes the interesting suggestion that behavior genetic data might elucidate some of the psychological mechanisms underlying age preferences in mates. It is possible that variation in the male preference for relative youth has been reduced by natural selection, just as has variation in the tendency to walk upright. There is genetic variation in most human behavioral traits, however, and it would be worth using family, twin, and adoption designs to examine whether the preference for relative youth in males, or the preference for relative age in females runs in families. In keeping with the suggestion that individual differences are important (**Lippa, Mealey, Rushton**), it would be of interest to see whether such preferences covaried with other behavioral tendencies. For example, Simpson and Gangestad (1991) have conducted research on individual differences in "sociosexuality," finding evidence that some people of both sexes are more inclined towards monogamous, and others towards promiscuous, sexual relationships. We would suspect that the preference for older males is stronger in monogamous women, who expect to profit from a man's resources. Assuming such empirical relationships existed, modern gene-mapping techniques might eventually be used to determine whether such behavioral characteristics were genetically linked.

Lippa makes a number of interesting empirical suggestions. One is that variables that have relatively high evolutionary relevance, such as physical attractiveness, might be less susceptible to contextual manipulations than other variables. We do have data suggesting that perceptions of physical attractiveness are not immune to context effects (Kenrick & Gutierres 1980; Kenrick et al. 1989). After viewing highly attractive faces or physiques, subjects rated average-looking people as relatively less attractive. However, there is some suggestion of evolutionarily relevant interactions in this research. Both sexes showed contrast effects in ratings of strangers, but differed in responses to their mates. Men exposed to centerfold beauties from magazines such as *Playboy* and *Penthouse* rated their wives or girlfriends as less attractive than did controls exposed to abstract art. However, women exposed to attractive male centerfolds from magazines such as *Playgirl* did not subsequently lower their rated attraction to their husbands or boyfriends (Kenrick et al. 1989). In a more recent study, men exposed to attractive female facial photos lowered their ratings of their relationships with their girlfriends, whereas exposure to attractive men had no impact on women's ratings of their relationships with their boyfriends. Conversely, exposure to socially dominant women had no effect on men's, but did have a diminishing effect on women's ratings of their current relationships (Kenrick et al. 1991). This finding is in keeping with another point made by Lippa, regarding the importance of deriving interactive predictions from evolutionary assumptions. Some of the most interesting interactions should involve gender differences in attention, perception, and cognition (see Kenrick, 1989b, for a discussion of related findings).

Epistemological questions

Two sets of questions deal with issues that go beyond a simple empirically based response. The first set deals with crossing levels of analysis, such as proximate to ultimate, cultural to biological, or psychological to biological. The second set deals with whether one scientific "construction" is as good as any other.

Crossing levels of analysis? Several commentators raised questions related to the appropriate level of analysis for explanations of mate selection. Although the commentators generally understood that we wished to integrate proximate social psychological and ultimate evolutionary models of age preferences in mate selection (e.g., **Lippa**), **Grammer** suggested that we (at least sometimes) inappropriately dichotomized proximate social psychological explanations *versus* ultimate evolutionary explanations. Other comments also supported Grammer's point that we needed more clarification on this issue (**Borkenau, Levinger & Kirkpatrick, Moffatt & Nelson**). We view proximate and ultimate causes as necessarily interlocked in the explanation of behavior (Kenrick & Hogan 1992). Our view is that proximate

determinants of behavior, such as salient or attention-grabbing stimuli in the immediate environment, cannot be fully understood without attention to more "ultimate" background causal factors. Stimuli that are attention grabbing (such as a handsome powerful man to a woman or a young healthy woman to a man) have their attraction because of a background of learning experiences which themselves build on genetic predispositions to notice and remember certain stimuli more than others. These in turn build on an evolutionary history in which certain activities contributed more to survival than others. Charles Darwin's work certainly moved back and forth between different levels of analysis, from Charles Lyell's theories of geological time to observations of the contemporary similarity and dispersion of bird species. It would make little sense to attempt to pit an explanation at the evolutionary level of analysis against an explanation that focuses on more proximate cognitions or learning experience – all are part of a hierarchically interwoven explanatory whole.

We did occasionally pit a social psychological model against an evolutionary model. In doing so, we were not suggesting that social psychological and evolutionary models are normally mutually exclusive. All social psychological models assume an evolved organism, although as Symons points out, most assume very general sexually monomorphic mechanisms. There is, in fact, a common assumption that human preferences are so general and unconstrained that a consideration of our evolutionary history will yield few differential predictions about human behavior. From that perspective, all of the differences between people are due to influences from individuals' environments, not their genes. **Levinger & Kirkpatrick** illustrate some of the corollaries of this position when they state that "mate selection is a social process, not a biological one," and that "biology has nothing to say" about individual variation or cultural norms. If such arguments are correct, social psychologists need only study the "nurture" of individual human social behavior while leaving the study of "nature" to biologists who examine behavior across different species. Evolutionary psychologists believe that our models are incomplete unless we consider the ultimate biological background of individual differences. The debate is not "nature versus nurture," then, but "*nature plus nurture* versus *nurture only*."

Psychologists gain explanatory power by considering the biological background of behavior, whether at the proximate level of biochemistry, the relatively ultimate level of behavior genetics, or the still more ultimate level of evolutionary history. Consider, at the most proximate level, the case of PKU (phenylketonuria): a form of mental retardation that can be controlled by removing foods containing phenylalanine from the child's diet. A psychologist who insisted on treating only the family environment of a child with PKU would do serious harm. Consider, at a slightly more ultimate level of causality, the evidence of substantial genetic variance in serious mental disorders such as schizophrenia (Gottesman et al. 1982). Researchers who myopically focused on family environment noticed the frequent family concordance for schizophrenia but incorrectly concluded that the disorder must be learned. Consider, at a still more ultimate level of explanation, the cross-cultural universality of the gender difference in homicide: ratios of male to female homicide perpetrators are 8 or 9 to 1 in all cultures studied. Sociologists and psychologists aware only of the same difference in our society confidently constructed explanations in terms of supposed sex-biased prescriptive norms that caused men in our society to act violently (Daly & Wilson 1988b). And now consider the very data presented in the target article and replicated by several commentators in diverse cultures. In light of those data, it seems obvious that psychologists who confidently explained sex differences in age preferences in terms of norms peculiar to American society could have gained a useful perspective by considering the biological background of human behavior.

More generally, a consideration of the evolutionary background of behavior leads us to consider several classes of variables that have been invisible to social psychologists for several decades. These include individual differences (**Lippa, Mealey, Rushton**), which have traditionally been treated as unimportant noise by social psychologists (Hogan & Emler 1978; Kenrick 1986; Kenrick & Dantchik 1983). Several decades of research on the person/situation debate now indicate that social psychologists were wrong in rejecting the importance of personality traits (e.g., Epstein 1979; Funder & Ozer 1983; Kenrick & Funder 1988; 1991; Kenrick & Stringfield 1980). In addition, an evolutionary approach to social behavior brings to light a number of gender differences that were either invisible or inexplicable to social psychological researchers adopting radically proximate explanatory frameworks (cf. Daly & Wilson 1983; 1988b; Kenrick 1987; Kenrick et al. 1990). An evolutionary approach also connects findings on proximate mechanisms of neurophysiology, attention, cognition, and emotion with findings on learning, development, and behavior genetics. Beyond this, it places these findings in the context of related findings from anthropology, sociology, and zoology. To work at the proximate level of analysis without ever considering the larger context of relevant knowledge is like studying geography using only local road maps and refusing to look at the atlas.

Dewsbury is right in pointing out that psychologists' attention to the evolutionary background of behavior did not die after McDougall. In fact, Dewsbury's own area of comparative psychology can be credited with keeping Darwin alive in the discipline. However, the tradition did indeed die, or at least go into a long coma, in McDougall's own area of social psychology.

The relationship between culture and genes. The assumption of Levinger & Kirkpatrick that biology has nothing to say about cultural norms also deserves a response. There is actually a rather interesting literature that deals with the relationship between cultural and genetic influences on behavior (e.g., Barkow 1989; Campbell 1975; Durham 1979; Lumsden & Wilson 1985) and Crawford's distinction between primary and secondary evolutionary predictions is meant to take these interactions into account. Very briefly, genetic influences can be related in a number of ways to cultural influences. At the simplest level, cultural mechanisms may grow out of genetic predispositions. For example, the fact that most armies throughout human history have placed men in combat positions does not reflect a specific gene for "joining the

army" in males. However, it may reflect a number of other predispositions that are more prominent in males than females (e.g., the greater proneness to violence and to competitiveness; Daly & Wilson 1988b; Kenrick 1987). The predominance of cooking recipes that include sugar probably also reflects a general human tendency to prefer sweet-tasting substances (Lumsden & Wilson 1981). In cases such as food preference, cultural influences may actually facilitate behaviors that are predisposed by genes. Culture may at other times interfere with genetic influences. Cultural factors may operate as "cross-winds" that move individuals off the genetically predisposed path of least resistance. Mandatory education in many modern societies acts to interfere with other biologically predisposed behaviors, such as reproduction (although perhaps not as much as some conservative parents might wish). Or, as Campbell (1975) noted, cultural influences may be designed specifically to act against biological predispositions (rules about sexuality and violence are examples of such normative influences). There may be "norms" regarding age preferences that fall into each of these categories. For example, rules prohibiting sexual relations between individuals above 18 and those below are probably designed to stem the male predisposition to be attracted to younger females.

Scientific constructions? Versions of the "constructivist" position on the arguments in the target article are adopted by both **Bayer** and **Dupré**. According to this type of argument, scientific theories are products of particular historical and political biases (and, in the radical version, nothing more). Bayer suggests that our target article reflects the presumably outmoded construction that "nature . . . in and of itself (is) a driving force of a particular social order." Bayer cites Hubbard's argument that Darwin's theory of evolution was merely a "projection" of Malthusian theory and Victorian society onto nature. Although Bayer does not go into detail, Hubbard's position is that Darwin's theory arose in response to the first wave of feminism, and the resurgence of interest in "sociobiology" was simply a defensive response to the later wave of feminism in the 1960s and 1970s (see Kenrick, 1987, for a discussion of Hubbard's position). Dupre advances a similar argument in suggesting that the target article demonstrates covert class bias and "androcentrism." In contrast, **Funder** commends our search for a "nonarbitrary" social psychology. He traces the development of a social constructivism which, in its extreme form, questions whether reality exists. Funder argues that the cross-cultural and cross-methodological robustness of our findings, and those of similar investigations, pose serious difficulties for this nihilistic constructivism.

The scientific "construction" issues are serious ones. If the extreme constructivist position is right, "empirical findings" in the social sciences have little more validity than political manifestos. Instead of wasting time collecting data, we all might as well devote our time to writing more eloquent manifestos. We think that the constructivist rejection of Darwinian theory is seriously flawed. It has enjoyed some currency in social psychology and related fields, however, and justifies a careful "deconstruction."

In one sense, the constructivist argument is a step ahead of where most empirical scientists ever get in scientific self-consciousness. It is certainly correct to assume that scientific ideas are influenced by their historical context or Zeitgeist, and scientists should strive to consider all such potential biases that might influence their interpretation of data. A large part of the history of science has been the discovery of methods for collecting data in ways that keep various biases under control. Where the constructivist position often goes wrong is in assuming that in uncovering a bias one has necessarily uncovered an error. Biases may lead to errors, but not necessarily. As Funder (1987) points out cogently in a paper on social perception, judgmental "biases" (such as the Ponzo, or "railroad tracks" illusion commonly used in general psychology texts) often exist because they lead, under normal circumstances, to accurate judgments. Let us take the case of Charles Darwin, and grant that his judgment may well have been "biased" by his reading of Malthus, his class background, and any number of then stylish prejudices. Does admitting that Darwin was "biased" necessarily lead to the rejection of the theory of evolution by natural selection that he proposed? No. Many scientific ideas are grounded in political/historical biases (Copernicus's and Kepler's ideas about the solar system were based on religious beliefs about simplicity in God's plan), others are based on even less glamorous sources (Kekule's hypothesis about the structure of the benzene molecule was based on his famous hypnogogic reverie about a snake biting its tail, which a Freudian might trace further back to unresolved issues with sexuality). What distinguishes scientific hypotheses from other beliefs, ideas, and fantasies is that they are made into testable propositions. Unlike political or religious beliefs, the scientific proposition stands to be rejected on the basis of data. If fossil records did not reveal that animal species had changed over historic epochs, for example, Darwin's theory would have suffered. If later research had not confirmed a mechanism by which animals could pass their characteristics from one generation to the next, Darwin's theory would have suffered. It is not enough that a lot of people with a lot of different political and historical biases disliked aspects of Darwin's theory. If the Lamarckians or the creationists or the constructivists provided alternatives that led to testable hypotheses, and if those alternatives better accounted for new and existing data, then Darwin's theory would have to be replaced.

In the case of the data presented in the target article, we would be happy to adopt an alternative "construction," rooted in biases androcentric, gynocentric, ethnocentric or zoocentric, provided it could account parsimoniously for the cross-cultural and cross-historical patterns in the data. The construction that older women do not marry because they choose not to (**Dupré**) may have some hope of empirical confirmation, but it does not seem to explain parsimoniously most aspects of our data. The construction that "reproductive practices . . . speak to our intimate relations as the social constructions of particular historical moments" (**Bayer**) seems to ignore the data already on hand and is thus hobbled at the starting gate.

Students in Plato's academy devoted themselves to the study of mathematics and science. Plato was opposed to the Sophists, who adopted a relativistic and ultimately nihilistic view of reality (Stumpf 1966). The fact that

scientific facts have been put to use to build bridges, send humans to the moon, and to conduct laser surgery, suggests that there is a reality, and that some scientific "constructions" are better mapped onto that reality. We believe that our findings and those of others in the reemerging area of evolutionary social psychology suggest that Darwin's theory can bring maps of the human behavior terrain into better correspondence with social reality.

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References

Acsadi, G. & Nemeskeri, J. (1970) *History of human life span and mortality.* Akademiai Kiado. [rDTK]

Alatalo, R. V., Lundberg, A. & Glynn, C. (1986) Female pied flycatchers choose territory quality and not male characteristics. *Nature* 323:152–53. [AJN]

Alexander, R. D. (1987) *The biology of moral systems.* Aldine de Gruyter. [aDTK, JAS]

Alley, T. R. (1983) Growth-produced changes in body shape and size as determinants of perceived age and adult caregiving. *Child Development* 54:241–48. [TRA]

(1988) The effects of growth and aging on facial aesthetics. In: *Social and applied aspects of perceiving faces,* ed. T. R. Alley. Erlbaum. [TRA]

Alley, T. R. & Cunningham, M. R. (1991) Average faces are attractive, but very attractive faces are not average. *Psychological Science* 2:123–25. [TRA]

Amsell, A. & Rashotte, M. E. (1984) *Mechanisms of adaptive behavior: Clark L. Hull's theoretical papers, with commentary.* Columbia University Press. [DAD]

Anderson, C. M. (1986) Female age: Male preferences and reproductive success in primates. *International Journal of Primatology* 7:305–26. [CAM]

Anderson, J. L. & Crawford, C. B. (1988) Anorexia nervosa: Models of the disorder as an adaptation for reproductive suppression. *Canadian Psychological Association Symposium on Testing Evolutionary Hypotheses about Pathological Behaviors.* Montreal, June 11. [CBC]

Anderson, N. H. (1981) *Foundations of information integration theory.* Academic Press. [RL]

Antill, J. K. (1983) Sex-role complementarity versus similarity in married couples. *Journal of Personality and Social Psychology* 45:145–55. [aDTK]

Ashmore, R. D. (1990) Sex, gender and the individual. In: *Handbook of personality: Theory and research,* ed. L. A. Pervin. Guilford Press. [RL]

Atkinson, M. P. & Glass, B. L. (1985) Marital age heterogamy and homogamy, 1900 to 1980. *Journal of Marriage and the Family* 47:685–91. [GS]

Austrom, D. & Hanel, K. (1985) Psychological issues of single life in Canada: An exploratory study. *International Journal of Women's Studies* 8:12–23. [DWR]

Bancroft, J. (1978) The relationship between hormones and sexual behavior in humans. In: *Biological determinants of sexual behavior,* ed. J. B. Hutchinson. Wiley. [aDTK]

Barash, D. P. (1982) *Sociobiology and behavior, 2nd ed.* Elsevier. [aDTK]

Barkow, J. H. (1989a) *Darwin, sex and status: Biological approaches to mind and culture.* University of Toronto Press. [LM]

(1989b) The elastic between genes and culture. *Ethology and Sociobiology* 10:111–29. [rDTK]

Barlow, D., Reynolds, J. & Agras, S. (1973) Gender identity change in a transsexual. *Archives of General Psychiatry* 28:569–76. [JMT]

Basolo, A. L. (1990) Female preference predates the evolution of the sword in swordtail fish. *Science* 250:808–10. [AJN]

Batson, C. D. (1987) Prosocial motivation: Is it ever truly altruistic? *Advances in Experimental Social Psychology* 20:65–122. [PB]

Beach, F. A.(1947) Evolutionary changes in the physiological control of mating behavior in mammals. *Psychological Review* 54:279–315. [DAD]

Bell, A. P. & Weinberg, M. S. (1978) *Homosexualities.* Simon & Schuster. [JMT]

Belsky, J., Steinberg, L. & Draper, P. (in press) Childhood experience, interpersonal development, and reproductive strategy: An evolutionary theory of socialization. *Child Development.* [LM]

Berlin, B. & Kay, P. (1969) *Basic color terms.* University of California Press. [DCF]

Bernard, J. (1979) Forward. In: *Divorce and separation,* ed. G. Levinger & O. Moles. Basic Books. [JMT]

Berry, D. S. & Zebrowitz-McArthur, L. (1988) The impact of age-related craniofacial changes on social perception. In: *Social and applied aspects of perceiving faces,* ed. T. R. Alley. Erlbaum. [TRA]

Berscheid, E. (1985) Interpersonal attraction. In: *Handbook of social psychology,* vol. 2, 3rd ed., ed. G. Lindzey & E. Aronson. Random House. [RL]

Betzig, L. L. (1982) Despotism and differential reproduction: A cross-cultural correlation of conflict asymmetry. *Ethology and Sociobiology* 3:209–21. [JMT]

(1986) *Despotism and differential reproduction.* Aldine. [PLvdB]

Betzig, L. L., Borgerhoff Mulder, M. & Turke P., eds. (1988) *Human reproductive behavior.* Cambridge University Press. [PLvdB]

Blain, J. & Barkow, J. (1988) Father involvement, reproductive strategies, and the sensitive period. In: *Sociobiological perspectives on human development,* ed. K. B. MacDonald. Springer-Verlag. [LM]

Blakeslee, S. (1991) Research on birth defects turns to flaws in sperm. *New York Times Medical Science* January 1, p. 1. [DB]

Bleier, R. (1984) *Science and gender: A critique of biology and its theories on women.* Pergamon Press. [BMB]

Bloom, D. & Trussell, J. (1984) What are the determinants of delayed childbearing and permanent childlessness in the United States? *Demography* 21:591–611. [JMT]

Blumstein, P. & Schwartz, P. (1983) *American couples.* Morrow, [JMT]

Bolig, R., Stein, P. J. & McKenry, P. C. (1984) The self-advertisement approach to dating: Male–female differences. *Family Relations* 33:587–92. [aDTK]

Boorstin, D. J. (1983) *The discoverers.* Random House. [rDTK]

Borgerhoff Mulder, M. (1988) Kipsigis bridewealth payments. In: *Human reproductive behaviour,* ed. L. L. Betzig, M. Borgerhoff Mulder & P. Turke. Cambridge University Press. [PLvdB]

Boyd, R. & Richerson, P. J. (1985) *Culture and the evolutionary process.* University of Chicago Press. [LM]

Brehm, S. S. (1985) *Intimate relationships.* Random House. [aDTK, DCF]

Brewer, M. B. & Lui, L. N. (1989) The primacy of age and sex in the structure of person categories. *Social Cognition* 7:262–74. [aDTK]

Broude, G. J. (1987) The relationship of marital intimacy and aloofness to social environment: A hologeistic study. *Behavior Science Research* 21:50–69. [GJB]

Burley, N. (1983) The meaning of assortative mating. *Ethology and Sociobiology* 4:191–203. [LM]

Buss, D. M. (1987) Sex differences in human mate selection criteria: An evolutionary perspective. In: *Sociobiology and Psychology,* ed. C. Crawford, M. Smith & D. Krebs. Erlbaum. [PAR, NWT]

(1989) Sex differences in human mate preferences: Evolutionary hypotheses tested in 37 cultures. *Behavioral and Brain Sciences* 12:1–49. [arDTK, NDG, LM, DWR, JAS, JMT, KW]

(1991) Evolutionary personality psychology. *Annual Review of Psychology* 32:459–91. [RL]

Buss, D. M. & Barnes, M. F. (1986) Preferences in human mate selection. *Journal of Personality and Social Psychology* 50:559–70. [aDTK, LM]

Buss, D. M. & Schmitt, D. (1989) Short-term and long-term mating tactics in humans. Presented at Human Behavior and Evolution Society first annual meeting. Northwestern University, August. [LM]

Byrne, D. (1971) *The attraction paradigm.* Academic Press. [aDTK, JAS]

Bytheway, W. R. (1981) The variation with age of age differences in marriage. *Journal of Marriage and the Family* 43:923–26. [rDTK, RS]

Cameron, C., Oskamp, S. & Sparks, W. (1977) Courtship American style – newspaper ads. *Family Coordinator* 26:27–30. [aDTK]

Campbell, D. T. (1975) On the conflicts between biological and social evolution and between psychology and moral tradition. *American Psychologist* 30:1103–26. [rDTK]

Carter, H. & Glick, P. C. (1976) *Marriage and divorce: A social and economic study,* rev. ed. Harvard University Press. [rDTK, RS]

Chagnon, N. A. (1967) *Yanomamo: The fierce people.* Holt, Rinehart & Winston. [PLvdB]

(1974) *Studying the Yanomamo.* Holt, Rinehart & Winston. [PLvdB]

(1988) Male Yanomamo manipulations of kinship classifications of female kin for reproductive advantage. In: *Human reproductive behavior: A*

Darwinian perspective, ed. L. Betzig, M. Borgerhoff Mulder & P. Turke. Cambridge University Press. [DS]
Chagnon, N. A. & Irons, W. (1979) *Evolutionary biology and human social behavior*. Duxbury Press. [PLvdB]
Chambers, K. C. & Phoenix, C. H. (1982) Sexual behavior in old male rhesus monkeys: Influence of familiarity and age of female partners. *Archives of Sexual Behavior* 11:299–308. [DB]
Clark, M. S. & Reis, H. T. (1988) Interpersonal processes in close relationships. *Annual Review of Psychology* 39:609–72. [aDTK]
Clutton-Brock, T. H. (1984) Reproductive effort and terminal investment in iteroparous animals. *American Naturalist* 123:212–29. [aDTK]
Clutton-Brock, T. H., Guiness, F. E. & Albon, S. D. (1982) *Red deer: Behavior and ecology of two sexes*. University of Chicago Press. [arDTK]
Coale, A. J., Demeny, P. & Vaughan, B. (1983) *Regional model life tables and stable populations*, 2nd ed. Academic Press. [GS]
Cohen, S. & Wills, T. A. (1985) Stress, social support, and the buffering hypothesis. *Psychological Bulletin* 98:310–57. [aDTK]
Cook, M. (1984) *Issues in person perception*. Methuen. [DCF]
Cooper, W. S. (1987) Decision theory as a branch of evolutionary theory: A biological derivation of the savage axioms. *Psychological Review* 94:395–411. [aDTK]
Cosmides, L. & Tooby, J. (1987) From evolution to behavior: Evolutionary psychology as the missing link. In: *The latest on the best: Essays on evolution and optimality*, ed. J. Dupré. MIT Press. [JAS, NWT]
(1989) Evolutionary psychology and the generation of culture II, Case study: A computational theory of social exchange. *Ethology and Sociobiology* 10:51–97. [aDTK, GJB, LM]
Crawford, C. B. (1989) The theory of evolution: Of what value to psychology? *Journal of Comparative Psychology* 103:4–22. [CBC]
Crawford, C. B. & Anderson, J. L. (1988) Testing evolutionary hypotheses about pathological behaviors. Paper presented at meetings of the Canadian Psychological Association, Montreal, June. [JAS]
(1989) Sociobiology: An environmentalist discipline. *American Psychologist* 44:1449–59. [aDTK]
Crawford, C., Smith, M. & Krebs, D. (1987) *Sociobiology and psychology: Ideas, issues and applications*. Erlbaum. [LM]
Critelli, J. W. & Waid, D. R. (1980) Physical attractiveness, romantic love, and equity restoration in dating relationships. *Journal of Personality Assessment* 44:624–29. [aDTK]
Cunningham, M. R. (1981) Sociobiology as a supplementary paradigm for social psychological research. In: *Review of Personality & Social Psychology* 2:69–106, ed. L. Wheeler. Sage Press. [aDTK]
(1986) Measuring the physical in physical attractiveness: Quasi-experiments on the sociobiology of female beauty. *Journal of Personality & Social Psychology* 50:925–35. [aDTK]
Dabbs, J. M., Frady, R. L., Carr, T. S. & Besch, N. F. (1987) Saliva, testosterone and criminal violence in young adult prison inmates. *Psychosomatic Medicine* 49:174–82. [aDTK]
Daly, M. & Wilson, M. (1983) *Sex, evolution, and behavior*, 2nd ed. Willard Grant Press. [arDTK, JAS]
(1983) *Sex, evolution, and behavior*. Duxbury. [JMT]
(1988a) Evolutionary social psychology and family homicide. *Science* 242:519–24. [aDTK]
(1988b) *Homicide*. Aldine de Gruyter. [arDTK, NWT]
Darden, D. K. & Koski, P. R. (1988) Using the personal ads: A deviant activity? *Deviant Behavior* 9:383–400. [DWR]
Darwin, C. (1859) *On the origin of the species*. Murray. [aDTK]
(1874) The descent of man and selection in relation to sex, 2nd ed. John Murray. [AJN]
Davidson, A. R. & Jaccard, J. J. (1974) Population psychology: A new look at an old problem. *Journal of Personality and Social Psychology* 30:1073–82. [LM]
Davis, K. (1985) The meaning and significance of marriage in contemporary society. In: *Contemporary Marriage*, ed. K. Davis. Russell Sage. [JMT]
Denney, N. W., Field, J. K. & Quadagno, D. (1984) Sex differences in sexual needs and desires. *Archives of Sexual Behavior* 13:233–45. [JMT]
Department of Commerce, Bureau of the Census (1930) *Abstract of the fifteenth census of the United States*. U. S. Government Printing Office. [aDTK]
(1984) *Statistical abstract of the United States*. U. S. Government Printing Office. [aDTK]
Deutsch, F. M., Zalenski, C. M. & Clark, M. E. (1986) Is there a double standard of aging? *Journal of Applied Social Psychology* 16:771–75. [aDTK]
Dewsbury, D. A. (1984) Comparative psychology in the twentieth century. Van Nostrand Reinhold. [DAD]
intensity. *Developmental Psychology* 21:542–46. [JPR]
Draper, P. (1989) African marriage systems: Perspectives from evolutionary ecology. *Ethology and Sociobiology* 10(1):145–69. [PLvdB, HH]
Draper, P. & Belsky, J. (1990) Personality development in evolutionary perspective. *Journal of Personality* 58:141–61. [LM]
Draper, P. & Harpending, H. (1988) A sociobiological perspective on the development of human reproductive strategies. In: *Sociobiological perspectives on human development*, ed. K. B. MacDonald. Springer-Verlag. [LM]
Drickamer, L. C. (1974) Social rank, observability, and sexual behavior of rhesus monkeys (*Macaca mulatta*). *Journal of Reproduction and Fertility* 32:117–20. [GL]
Durham, W. (1979) The adaptive significance of cultural behavior. *Human Ecology* 4:89–121. [rDTK]
Eckland, B. K. (1968) Theories of mate selection. *Eugenics Quarterly* 15:71–84. [LM]
Edwards, J. N. (1969) Familial behavior as social exchange. *Journal of Marriage and the Family* 31:518–26. [RS]
Eibl-Eibesfeldt, I. (1989) *Human ethology*. Aldine de Gruyter. [TRA]
Ellis, B. & Symons, D. (1990) Sex differences in sexual fantasy: An evolutionary psychological approach. *Journal of Sex Research* 27:527–55. [JMT]
Epstein, S. (1979) The stability of behavior: I. On predicting most of the people much of the time. *Journal of Personality & Social Psychology* 37:1097–1126. [rDTK]
Evans-Pritchard, E. E. (1940) *The Nuer*. Oxford University Press. [PLvdB]
Eysenck, H. J. (1988) Personality and aging: An exploratory analysis. *Journal of Social Behavior and Personality* 3:11–21. [JPR]
Fauss, R. (1988) Zur Bedeutung des Gesichts für die Partnerwahl. *Homo* 37:188–201. [TRA]
Finch, C. E. & Gosden, R. G. (1986) Animal models for the human menopause. In: *Aging, reproduction, and the climacteric*, ed. L. Mastroianni Jr. & C. A. Paulsen. Plenum Press. [aDTK]
Fisher, R. A. (1930) *The genetical theory of natural selection*. Oxford University Press. [aDTK, KW]
Fiske, S. T. & Taylor, S. E. (1991) *Social cognition*, 2nd ed. McGraw-Hill. [RL]
Flinn, M. V. (1986) Correlates of reproductive success in a Caribbean village. *Human Ecology* 14:225–43. [LM]
Fortes, M. (1949) *The web of kinship among the Tallensi*. Oxford University Press. [PLvdB]
Frank, R. H. (1988) *Passions within reason*. W. W. Norton. [aDTK]
Funder, D. C. (1987) Errors and mistakes: Evaluating the accuracy of social judgment. *Psychological Bulletin* 101:75–90. [rDTK, DCF]
(1989) Accuracy in personality judgment and the dancing bear. In: *Personality research for the 1990's*, ed. D. Buss & N. Cantor. Springer-Verlag. [DCF]
Funder, D. C. & Ozer, D. J. (1983) Behavior as a function of the situation. *Journal of Personality & Social Psychology* 44:107–12. [rDTK]
Gergen, K. J. (1990) Metaphor, metatheory and the social world. In: *Metaphors in the history of psychology*, ed. D. E. Leary. Cambridge University Press. [BMB]
(1991) Emerging challenges for theory and psychology. *Theory and Psychology* 1:13–35. [BMB]
Ghiselin, M. T. (1989) Darwinism versus neo-Darwinism in the study of human mate preferences. *Behavioral and Brain Sciences* 12:20. [aDTK]
Gibson, G. D. (1959) Herero marriage. *Rhodes Livingstone Journal* 24:1–37. [HH]
Gladue, B. A. (1989) Missing link in mate preference studies: Reproduction. *Behavioral and Brain Sciences* 12:21. [BMB]
Glenn, N. D. (1989) Intersocietal variation in the mate preferences of males and females. *Behavioral and Brain Sciences* 12:21–23. [aDTK, NDG, JMT]
Goffman, E. (1952) On cooling the mark out: Some aspects of adaptation to failure. *Psychiatry* 15:451–63. [aDTK]
Goldman, N., Westoff, C. F. & Hammerslough, C. (1984) Demography of the marriage market in the United States. *Population Index* 50:2–25. [JMT]
Goldschmidt, W. (1969) Game theory, cultural values and the bride price in Africa. In: *Game theory in the behavioral sciences*, ed. I. R. Buchler & H. G. Nutini. University of Pennsylvania Press. [PLvdB]
Goodall, J. (1986) *The chimpanzees of Gombe: Patterns of behavior*. Bellknap Press. [DB]
Goody, J. & Tambiah, S. J. (1973) *Bridewealth and dowry*. Cambridge University Press. [PLvdB]
Gottesman, I. L., Shields, J. & Hanson, D. R. (1982) *Schizophrenia: The epigenetic puzzle*. Cambridge University Press (Cambridge). [rDTK]

Gould, S. J. (1977) *Ontogeny and phylogeny*. Harvard University Press. [TRA]
(1981) *The mismeasure of man*. W. W. Norton. [DB]
Gould, S. J. & Lewontin, R. C. (1979) The spandrels of San Marco and the Panglossian paradigm: A critique of the adaptationist programme. *Proceedings of the Royal Society of London* 205:581–98. [CAM]
Grammer, K. (1989) Human courtship: Biological bases and cognitive processing. In: *The sociobiology of sexual and reproductive strategies*, ed. A. Rasa, C. Vogel & E. Volland. [KG]
Green, R. (1987) *The "sissy boy syndrome" and the development of homosexuality*. Yale University Press. [JMT]
Greenblatt, H. N. & Smith, R. E. (1971) *Marriage and divorce in California, 1966–1969*. State of California, Dept. of Public Health, Sacramento. [RS]
Gross, M. (1984) Sunfish, salmon, and the evolution of alternative reproductive strategies and tactics in fishes. In: *Fish reproduction: Strategies and tactics*, ed. G. Potts & R. Wootton. Academic Press. [aDTK]
Gross, M. & Averill, M. B. (1983) Evolution and the patriarchal myths of scarcity and competition. In: *Discovering reality: Feminist perspectives on epistemology, metaphysics, methodology, and philosophy of science*, ed. S. Harding & M. B. Hintikka. D. Reidel. [BMB]
Guttentag, M. & Secord, P. F. (1983) *Too many women? The sex ratio question*. Sage. [aDTK]
Hamilton, W. D. (1964) The genetic evolution of social behavior. *Journal of Theoretical Biology* 7:1–51. [PB]
Haraway, D. (1990) Investment strategies for the evolving portfolio of primate females. In: *Body/politics: Women and the discourses of science*, ed. M. Jacobus, E. F. Keller, & S. Shuttleworth. Routledge. [BMB]
(1991) Simians, cyborgs, and women: The reinvention of nature. Routledge. [BMB]
Harman, S. M. (1981) Testosterone replacement therapy. *Medical Aspects of Human Sexuality* 15(9):111–12. [DB]
Harpending, H. & Pennington, R. (1991) Age structure and sex biased mortality among Ovaherero pastoralists. *Human Biology* 63:327–52. [HH]
Harrison, A. A. & Saeed, L. (1977) Let's make a deal: Analysis of revelations and stipulations in lonely hearts advertisements. *Journal of Personality and Social Psychology* 35:257–64. [aDTK]
Hass, P. H. (1974) Wanted and unwanted pregnancies: A fertility decision-making model. *Journal of Social Issues* 30:125–65. [LM]
Hendrick, S. S. (1981) Self-disclosure and marital satisfaction. *Journal of Personality and Social Psychology* 40:1150–59. [aDTK]
Hill, E. & Hill, M. A. (1988) Resources and reproductive effort: The positive effect of doing relatively well. Presented at the Evolutionary Psychology and Psychiatry Conference, Ann Arbor, MI, October. [LM]
Hill, J. (1984) Prestige and reproductive success in man. *Ethology and Sociobiology* 5:77–95. [aDTK, LM]
Hinde, R. A. (1983) Why do the sexes behave differently in close relationships? *Journal of Social and Personal Relationships* 1:471–501. [aDTK]
Hogan, R. & Emler, N. P. (1978) The biases in contemporary social psychology. *Social Research* 45:479–534. [rDTK]
Horvath, T. (1979) Correlates of physical beauty in men and women. *Social Behavior and Personality* 7:145–51. [TRA]
House, J. S., Robbins, C. & Metzner, H. L. (1982) The association of social relationships with mortality: Prospective evidence from the Tecumseh Community Health Study. *American Journal of Epidemiology* 116:123–40. [aDTK]
Houseknecht, S. K. (1979) Timing of the decision to remain voluntarily childless: Evidence for continuous socialization. *Psychology of Women Quarterly* 4:81–96. [LM]
Howard, L. & Zeman, N. (1991) A main-squeeze poll. *Newsweek*, March 25, p. 8. [DWR]
Hubbard, R. (1983) Have only men evolved? In: *Discovering reality: Feminist perspectives on epistemology, metaphysics, methodology, and philosophy of science*, ed. S. Harding & M. B. Hintikka. D. Reidel. [BMB]
Huston, T. L. & Levinger, G. (1978) Interpersonal attraction and relationships. *Annual Review of Psychology* 29:115–56. [aDTK]
Irons, W. (1975) *The Yomut Turkmen*. Anthropological paper No. 58, Museum of Anthropology, University of Michigan. [PLvdB]
(1989) Mating preference surveys: Ethnographic follow-up would be a good next step. *Behavioral and Brain Sciences* 12:24. [DWR]
Jacobson, P. H. (1959) *American marriage and divorce*. Rinehart. [GL]
James, W. (1890) *Principles of psychology*. Holt. [aDTK]
James, W. H. (1974) Marital coital rates, spouses' ages, family size and social class. *Journal of Sex Research* 10:205–18. [aDTK]
Janson-Smith, D. (1980) Sociobiology: So what? In: *Alice through the microscope: The power of science over women's lives*, ed. L. Birke, W. Faulkner, S. Best, D. Janson-Smith, & K. Overfield. Virago. [BMB]
Jencks, C. (1979) *Who gets ahead? The determinants of economic success in America*. Basic Books. [aDTK, JAS]
Jussim, L. (1991) Social perception and social reality: A reflection-construction model. *Psychological Review* 98:54–73. [DCF]
Kelley, K. & Byrne, D. (1992) *Exploring human sexuality*. Prentice Hall. [DB]
Kenrick, D. T. (1986) How strong is the case against contemporary social and personality psychology: A response to Carlson. *Journal of Personality & Social Psychology* 50:839–44. [rDTK]
(1987) Gender, genes, and the social environment: A biosocial interactionist perspective. *Review of Personality & Social Psychology* 7:14–43. [arDTK]
(1989a) Altruism, Darwinism and the gift of Josiah Wedgewood. Comment on Rushton. *Behavioral and Brain Sciences* 12:531–32. [rDTK]
(1989b) Personality and reproductive behavior: Integrating the social psychological and the evolutionary perspectives. In: *Sociobiology and the social sciences*, ed. R. W. Bell. Texas Tech Press. [rDTK]
Kenrick, D. T. & Dantchik, A. (1983) Interactions, idiographics, and the social psychological invasion of personality. *Journal of Personality* 51:286–307. [rDTK]
Kenrick, D. T. & Funder, D. C. (1988) Profiting from controversy: Lessons from the person-situation debate. *American Psychologist* 43:23–34. [rDTK]
(1991) The person-situation debate: Do traits really exist? In: *Contemporary research in personality*, ed. V. Derlega, B. Winstead, & W. H. Jones. Nelson-Hall. [rDTK]
Kenrick, D. T. & Gutierres, S. E. (1980) Contrast effects and judgments of physical attractiveness: When beauty becomes a social problem. *Journal of Personality & Social Psychology* 38:131–40. [rDTK]
Kenrick, D. T. & Hogan, R. (1992) Evolution and social cognition. In: *The sociobiological imagination*, ed. M. Maxwell. SUNY Press, in press. [rDTK]
Kenrick, D. T. & Keefe, R. C. (1991) Age preferences in mates reflect sex differences in reproductive strategies. *Behavioral and Brain Sciences* 14:1–28. [DB]
Kenrick, D. T. & Stringfield, D. O. (1980) Personality traits and the eye of the beholder: Crossing some traditional philosophical boundaries in the search for consistency in all of the people. *Psychological Review* 87:88–104. [rDTK]
Kenrick, D. T. & Trost, M. R. (1987) A biosocial theory of heterosexual relationships. In: *Females, males, and sexuality: Theory and research*, ed. K. Kelley. State University of New York Press. [aDTK]
(1989) A reproductive exchange model of heterosexual relationships: Putting proximate economics in ultimate perspective. *Review of Personality and Social Psychology* 10:92–118. [aDTK]
Kenrick, D. T., Groth, G. E., Trost, M. R. & Sadalla, E. K. (1990) Effects of gender, self-appraisal, and involvement level on mate selection: Integrating sociobiological and social exchange perspectives on relationships, in preparation. [aDTK]
Kenrick, D. T., Gutierres, S. E. & Goldberg, L. (1989) Influence of erotica on ratings of strangers and mates. *Journal of Experimental Social Psychology* 25:159–67. [rDTK]
Kenrick, D. T., Montello, D. & MacFarlane, S. (1985) Personality: Social learning, social cognition, or sociobiology? In: *Perspectives in Personality* (vol. 1), ed. R. Hogan & W. H. Jones. JAI Press. [aDTK]
Kenrick, D. T., Neuberg, S., Zierk, K. & Krones, J. (1991) Contrast effects and mate attractiveness: Gender differences in criteria fit an evolutionary model. Unpublished manuscript. Arizona State University. [rDTK]
Kenrick, D. T., Sadalla, E. K., Groth, G. E. & Trost, M. R. (1990) Evolution, traits, and the stages of human courtship: Qualifying the parental investment model. *Journal of Personality* 58:97–117. [arDTK, LM]
Lancaster, J. & King, B. (1985) An evolutionary perspective on menopause. In: *In her prime*, ed. J. Brown & V. Kerns. Bergin & Garvey. [rDTK, CAM]
Langlois, J. H. & Roggman, L. A. (1990) Attractive faces are only average. *Psychological Science* 1:115–21. [aDTK, TRA, DS]
Leonard, J. L. (1989) *Homo sapiens:* A good fit to theory, but posing some enigmas. *Behavioral and Brain Sciences* 12:26–27. [aDTK, JAS, WGS]
Lippa, R. (1990) Gender and social behavior. In: *Introduction to social psychology*, ed. R. A. Lippa. Wadsworth. [RL]
Lockard, J. S. & Adams, R. M. (1981) Human serial polygyny: Demographic, reproductive, marital and divorce data. *Ethology and Sociobiology* 2:177–86. [aDTK, KG]

Lumsden, C. J. & Wilson, E. O. (1981) *Genes, mind, and culture: The coevolutionary process.* Harvard University Press. [arDTK, KG]
(1985) The relation between biological and cultural evolution. *Journal of Social and Biological Structures* 8:343–59. [rDTK]
Mackey, W. C. (1980) A sociobiological perspective on divorce patterns of men in the United States. *Journal of Anthropological Research* 36:419–28. [aDTK]
Mackey, W. C. & Mealey, L. (Submitted) Human sex ratio as a function of the woman's psychodynamics: Empirical tests from three samples. *Journal of Personality and Individual Differences.* [LM]
Malloy, T. E. & Albright, L. (1990) Interpersonal perception in a social context. *Journal of Personality and Social Psychology* 58:419–28. [DCF]
Margolin, L. & White, L. (1987) The continuing role of physical attractiveness in marriage. *Journal of Marriage* 49:21–27. [aDTK]
Mathes, E. W., Brennan, S. M., Haugen, P. M. & Rice, H. B. (1985) Ratings of physical attractiveness as a function of age. *Journal of Social Psychology* 125:157–68. [aDTK]
Maynard Smith, J. (1958) The effects of temperature and of egg-laying on the longevity of *Drosophila subobscura. Journal of Experimental Biology* 35:832–42. [aDTK]
Mayr, E. (1983) How to carry out the adaptationist paradigm? *American Naturalist* 121:324–34. [CAM]
Mazur, A. & Lamb, T. (1980) Testosterone, status, and mood in human males. *Hormones and Behavior* 14:236–46. [aDTK]
McArthur, L. Z. & Baron, R. M. (1983) Toward an ecological theory of social perception. *Psychological Review* 90:215–38. [DCF]
McDougall, W. (1908) *Social psychology.* Methuen. [aDTK]
(1930) William McDougall. In: *A history of psychology in autobiography, vol. 1,* ed. C. Murchison. Clark University Press. [DAD]
McGrath, J. E. (1982) Dilemmatics. In: *Judgment calls in research,* ed. J. E. McGrath, J. Martin & R. A. Kukla. Sage. [rDTK]
Mead, M. (1928) *Coming of age in Samoa.* Morrow. [JMT]
(1935) *Sex and temperament in three primitive societies.* Morrow. [JMT]
Mealey, L. (1985) The relationship between social status and biological success: A case study of the Mormon religious hierarchy. *Ethology and Sociobiology* 6:249–57. [aDTK, LM]
(1990) Differential use of reproductive strategies by human groups? *Psychological Science* 1:385–97. [LM]
Mealey, L. & Mackey, W. C. (1990) Variation in offspring sex ratio in women of differing social status. *Ethology and Sociobiology* 11:83–95. [LM]
Mealey, L., Bouchard, T. J. Jr. & Segal, N. (in preparation) Heritable and environmental variables affect reproduction-related behaviors, but not ultimate reproductive success. [LM]
Menken, J. & Larsen, U. (1986) Fertility rates and aging. In: *Aging, reproduction, and the climacteric,* ed. L. Mastroianni & C. A. Paulsen. Plenum Press. [aDTK]
Money, J. (1980) *Love and love sickness.* Johns Hopkins University Press. [JMT]
Morawski, J. G. (1985) The measurement of masculinity and femininity: Engendering categorical realities. *Journal of Personality* 53:196–223. [BMB]
Morawski, J. G. & Steele, R. S. (1991) The one or the other? Textual analysis of masculine power and feminist empowerment. *Theory and Psychology* 1:107–31. [BMB]
Moss, J. J. (1964) Teenage marriage: Cross-national trends and sociological factors in the decision of when to marry. *Acta Sociologica* 8:98–115. [LM]
Murdock, G. (1949) *Social structure.* Macmillan. [NWT]
(1959) *Africa: Its peoples and their culture history.* McGraw-Hill. [PLvdB]
Nadel, S. F. (1942) *A black Byzantium.* Oxford University Press. [PLvdB]
Nafiey, A. (1981) Mate selection: The relative contributions of age, physical attractiveness, and income to desirability as romantic and marriage partners. Unpublished Ph.D. dissertation, The University of Texas at Austin. [LM]
Nieschlag, E. & Michel, E. (1986) Reproductive functions in grandfathers. In: *Aging, reproduction, and the climacteric,* ed. L. Mastroianni, Jr. & C. A. Paulsen. Plenum Press. [aDTK]
Nur, N. (1989) The sociobiology of human mate preference: On testing evolutionary hypotheses. *Behavioral and Brain Sciences* 12:28–29. [aDTK]
Nyborg, H. & Boeggild, C. (1989) Mating behavior: Moves of mind or molecules. *Behavioral and Brain Sciences* 12:29–30. [aDTK]
Orians, G. H. (1969) On the evolution of mating systems in birds and mammals. *American Naturalist* 103:589–603. [AJVN]
Parker, G. A. (1970) Sperm competition and its evolutionary consequences in the insects. *Biological Reviews* 45:525–68. [aDTK]
Partridge, L. & Farquhar, M. (1981) Sexual activity reduces lifespan of male fruit flies. *Nature* 294:580–82. [aDTK]
Partridge, L. & Harvey, P. H. (1988) The ecological context of life history evolution. *Science* 241:1449–55. [aDTK]
Pennington, R. (1990) The fertility of the Herero and Mbanderu pastoralists of Botswana. Ph.D. thesis, The Pennsylvania State University, University Park, PA. [HH]
(1991) Child fostering as a reproductive strategy among southern African pastoralists. *Ethology and Sociobiology* 12:83–104. [HH]
Pillard, R. & Weinrich, J. (1987) The periodic table model of the gender transpositions: Part I. A theory based on masculinization and defeminization of the brain. *Journal of Sex Research* 23:425–54. [JMT]
Plomin, R. (1986) *Development, genetics, and psychology.* Erlbaum. [JPR]
Plutchik, R. (1980) *Emotion: Theory, research, and experience.* Academic Press. [aDTK]
Presser, H. B. (1975) Age differences between spouses: Trends, patterns, and social implications. *American Behavioral Scientist* 19:190–205. [rDTK, RS]
Pressley, P. H. (1981) Parental effort and the evolution of nest-guarding tactics in the three-spined stickleback. *Gasterosteus aculeatus* L. *Evolution* 35:282–95. [aDTK]
Radcliffe-Brown, A. R. & Forde, D., eds. (1950) *African systems of kinship and marriage.* Oxford University Press. [PLvdB]
Rajecki, D. W., Bledsoe, S. B. & Rasmussen, J. L. (in press) Successful personal ads: Gender differences and similarities in offers, stipulations, and outcomes. *Basic and Applied Social Psychology.* [DWR]
Ralls, K. (1976) Mammals in which females are larger than males. *Quarterly Review of Biology* 51:245–76. [arDTK]
Remoff, H. T. (1980) Female choice: An investigation of human breeding strategy. Unpublished doctoral dissertation, Rutgers University. [LM]
Resnik, R. (1986) Age related changes in gestation and pregnancy outcome. In: *Aging, reproduction, and the climacteric,* ed. L. Mastroianni & C. A. Paulsen. Plenum Press. [aDTK]
Roe, A. & Simpson, G. G., eds. (1958) Behavior and evolution. Yale University Press. [DAD]
Rosenbaum, M. E. (1986) The repulsion hypothesis: On the nondevelopment of relationships. *Journal of Personality & Social Psychology* 51:1156–66. [rDTK]
Rosenblatt, P. C. (1974) Cross-cultural perspective on attraction. In: *Foundations of interpersonal attraction,* ed. T. L. Huston. Academic Press. [aDTK]
Rushton, J. P. (1989) Genetic similarity, human altruism and group selection. *Behavioral and Brain Sciences* 12(3):503–59. [arDTK, LM, JPR]
(1990) Sir Francis Galton, epigenetic rules, genetic similarity theory, and human life-history analysis. *Journal of Personality* 58:117–40. [JPR]
(1991) Do *r-K* strategies underlie human race differences? *Canadian Psychology* 32:29–42. [JPR]
Ryan, M. J., Fox, J. H., Wilczynski, W. & Rand, A. S. (1990) Sexual selection for sensory exploitation in the frog *Physalaemus pustulosus. Nature* 343:66–67. [AJN]
Sadalla, E. K., Kenrick, D. T. & Vershure, B. (1987) Dominance and heterosexual attraction. *Journal of Personality and Social Psychology* 52:730–38. [arDTK]
Sandelowski, M. J. (1990) Failures of volition: Female agency and infertility in historical perspective. *Signs: Journal of Women in Culture and Society* 15:475–99. [BMB]
Sayers, J. (1982) *Biological politics: Feminist and anti-feminist perspectives.* Tavistock. [BMB]
Scarr, S. (1985) Constructing psychology: Making facts and fables for our times. *American Psychologist* 40:499–512. [BMB]
Schaffer, L. S. (1983) Toward Pepitone's vision of a normative social psychology: What is a social norm? *Journal of Mind & Behavior* 4:275–94. [aDTK]
Schneirla, T. C. (1959) An evolutionary and developmental theory of biphasic processes underlying approach and withdrawal. *Nebraska Symposium on Motivation* 7:1–42. [DAD]
Schoen, R. (1984) Who marries whom? Age preferences in the 1970 U.S. marriage market. *Revue, Informatique et Statistique dans les Sciences Humaines* 20:203–16. [RS]
Schoen, R. & Thomas, B. (1989) Intergroup marriage in Hawaii, 1969–71 and 1979–81. *Sociological Perspectives* 32:365–82. [RS]
Schoen, R. & Wooldredge, J. (1989) Marriage choices in North Carolina and Virginia, 1969–71 and 1979–81. *Journal of Marriage and the Family* 51:465–81. [RS]
Schoen, R., Wooldredge, J. & Thomas, B. (1989) Ethnic and educational effects on marriage choice. *Social Science Quarterly* 70:617–30. [RS]
Sherman, P. W. (1988) The levels of analysis. *Animal Behaviour* 36:616–19. [CAM]
Shively, C. & Smith, D. G. (1985) Social status and reproductive success of

male *Macaca fascicularis*. *American Journal of Primatology* 9:129–35. [GL]
Shykoff, J. A. (1991) Female behavioural ecologists respond to novel male traits. *ISBE Newsletter* 3:2–5. [AJN]
Simpson, J. A. & Gangestad, S. (1991) Individual differences in sociosexuality: Evidence for convergent and discriminant validity. *Journal of Personality & Social Psychology* 60:870–83. [rDTK]
Sloman, S. & Sloman, L. (1988) Mate selection in the service of human evolution. *Journal of Social and Biological Structures* 11:457–68. [aDTK, DS, LM, SAS]
Sontag, S. (1979) The double standard of aging. In: *Psychology of women*, ed. J. Williams. Academic Press. [aDTK]
Sorensen, T. I. A., Nielsen, G. G., Andersen, P. K. & Teasdale, T. W. (1988) Genetic and environmental influences on premature death in adult adoptees. *New England Journal of Medicine* 318:727–32. [JPR]
Spence, J. T., Deaux, K. & Helmreich, R. L. (1985) Sex roles in contemporary American society. In: *Handbook of social psychology* vol. II, 3rd ed., ed. G. Lindzey & E. Aronson. Random House. [RL]
Stanovich, K. E. (1991) Cognitive science meets beginning reading. *Psychological Science* 2:70–81. [DCF]
Stearns, S. C. (1976) Life history tactics: A review of the ideas. *The Quarterly Review of Biology* 51:3-47. [aDTK]
Stern, B. R. & Smith, D. G. (1984) Sexual behavior and paternity in three captive groups of rhesus monkeys (*Macaca mulatta*). *Animal Behavior* 32:23–32. [GL]
Stevens, G. & Schoen, R. (1988) Linguistic intermarriage in the U.S. *Journal of Marriage and the Family* 50:267–79. [RS]
Stoller, R. (1982) Transvestism in women. *Archives of Sexual Behavior* 11:99–115. [JMT]
Stone, C. P. (1943) Multiply, vary, let the strongest live and the weakest die – Charles Darwin. *Psychological Bulletin* 40:1–24. [DAD]
Stumpf, S. E. (1966) *Socrates to Sartre: A history of philosophy*. McGraw-Hill. [rDTK]
Surbey, M. (1987) Anorexia nervosa, amenorrhea, and adaptation. *Ethology and Sociobiology* 9 (The ethology of psychiatric populations) 47S676S. ed. J. Feierman. [CBC]
Swedlund, A. C. & Armelagos, G. J. (1976) *Demographic anthropology*. Brown. [DB]
Symons, D. (1979) *The evolution of human sexuality*. Oxford University Press. [aDTK, TRA, PLvdB, RL, LN, JAS, DS, JMT, NWT]
(1980) Précis: The evolution of human sexuality. *Behavioral and Brain Sciences* 3(2):171–214. [GJB]
(1985) Darwinism and contemporary marriage. In: *Contemporary marriage: Comparative perspectives on a changing institution*, ed. K. Davis. Sage. [DS, JMT]
(1987a) An evolutionary approach: Can Darwin's view of life shed light on human sexuality? In: *Theories of human sexuality*, ed. J. H. Geer & W. T. O'Donohue. Plenum Press. [DS]
(1987b) If we're all Darwinians, what's the fuss about? In: *Sociobiology and psychology: Ideas, issues and applications*, ed. C. Crawford, M. Smith & D. Krebs. Erlbaum. [NWT]
(1989a) A critique of Darwinian anthropology. *Ethology and Sociobiology* 10:131–44. [rDTK]
(1989b) The psychology of human mate preferences. *Behavioral and Brain Sciences* 12:34–35. [aDTK, DS]
Symons, D. & Ellis, B. (1989) Human male-female differences in sexual desire. In: *Sociobiology of reproductive strategies*, ed. A. Rasa, C. Vogel & E. Voland. Chapman Hall. [JMT, NWT]
Theissen, D. D. & Gregg, B. (1990) Human assortative mating and genetic equilibrium. *Ethology and Sociobiology* 1:111–40. [LM]
Thornhill, N. W. (1989) Characteristics of female desirability: Facultative standards of beauty. *Behavioral & Brain Sciences* 12:35–36. [aDTK]
Thornhill, R. & Thornhill, N. W. (1991) Coercive sexuality of men: Is there psychological adaptation to rape? In: *Sexual coercion. A source book on its nature, causes and prevention*, ed. E. Grauerholz & M. A. Kosakwski. D. C. Heath & Co. [NWT]
(in press) The evolutionary psychology of men's coercive sexuality. *Behavioral and Brain Sciences*. [NWT]
Tinkle, D. W. (1969) The concept of reproductive effort and its relation to the evolution of life histories in lizards. *American Naturalist* 103:501–16. [aDTK]
Todd, J. T., Mark, L. S., Shaw, R. E. & Pittenger, J. B. (1980) The perception of human growth. *Scientific American* 242(2):132–44. [TRA]
Tolman, E. C. (1922) Can instincts be given up in psychology? *Journal of Abnormal and Social Psychology* 17:139–52. [DAD]
(1932) *Purposive behavior in animals and men*. Century. [DAD]
Tooby, J. (1982) Pathogens, polymorphism, and the evolution of sex. *Journal of Theoretical Biology* 97:557–76. [DS]
Tooby, J. & Cosmides, L. (1990) On the universality of human nature and the uniqueness of the individual: The role of genetics and adaptation. *Journal of Personality* 58:1–67. [RL, NWT]
Townsend, J. M. (1987) Sex differences in sexuality among medical students: Effects of increasing socioeconomic status. *Archives of Sexual Behavior* 16:427–46. [JMT]
(1989) Mate-selection criteria: A pilot study. *Ethology and Sociobiology* 10:241–53. [aDTK, JMT]
(n.d.) Sexuality and mate selection: Sex differences in ontogeny and criteria. Under review. [JMT]
Townsend, J. M. & Levy, G. D. (1990a) Effects of potential partners' physical attractiveness and socioeconomic status on sexuality and partner selection: Sex differences in reported preferences of university students. *Archives of Sexual Behavior* 19:149–64. [JMT]
(1990b) Effects of potential partners' costume and physical attractiveness on sexuality and partner selection. *Journal of Psychology* 124:371–89. [JMT]
Trivers, R. L. (1971) The evolution of reciprocal altruism. *The Quarterly Review of Biology* 46:35–57. [PB]
(1972) Parental investment and sexual selection. In: *Sexual selection and the descent of man*. ed. B. Campbell. Aldine. [aDTK, JMT]
(1985) *Social evolution*. Benjamin/Cummings. [aDTK]
Tutin, C. E. G. (1979) Mating patterns and reproductive strategies in a community of wild chimpanzees (*Pan troglodytes schweinfurthii*). *Behavioral Ecology and Sociobiology* 6:39–48. [DB]
United Nations (1989) *1987 demographis yearbook*. United Nations. [aDTK]
U.S. Bureau of the Census (1981) *Report of the U.S. Bureau of the Census*. U. S. Government Printing Office. [DB]
Udry, J. R. (1981) Marital alternatives and marital disruption. *Journal of Marriage and the Family* 43:889–97. [JMT]
Uhlenburg, P. (1980) Death and the family. *Journal of Family History* (Fall):313–20. [GS]
van Tienderen, P. H. & van Noordwijk, A. J. (1988) Dispersal kinship and inbreeding in an island population of the Great Tit. *Journal of Evolutionary Biology* 1:117–37. [AJvN]
Voland, E. (1990) Differential reproductive success within the Krummhorn population (Germany, 18th and 19th centuries). *Behavioral Ecology and Sociobiology* 26:65–72. [LM]
Voland, E. & Voland, R. (1989) Evolutionary biology and psychiatry: The case of anorexia nervosa. *Ethology and Sociobiology* 10:223–40. [CBC]
Walster, E., Walster, G. W. & Berscheid, E. (1978) *Equity: Theory and research*. Allyn & Bacon. [aDTK]
Warden, C. J. (1932) *The evolution of human behavior*. Macmillan. [DAD]
Wassar, S. K. & Barash, D. P. (1983) Reproductive suppression among female mammals: Implications for biomedicine and sexual selection theory. *Quarterly Review of Biology* 48:513–38. [CBC]
Weinrich, J. (1988) The periodic table model of the gender transpositions: Part II. Limerent and lusty sexual attractions and the nature of bisexuality. *Journal of Sex Research* 24:113–29. [JMT]
Willerman, L. (1979) *The psychology of individual and group differences*. Freeman. [JAS]
Williams, G. C. (1966) *Adaptation and natural selection: A critique of some current evolutionary thought*. Princeton University Press. [CAM, JAS]
(1975) *Sex and evolution*. Princeton University Press. [aDTK]
(1985) A defense of reductionism in evolutionary biology. *Oxford Surveys in Evolutionary Biology* 2:1–27. [DS]
Wilson, R. S. (1983) The Louisville twin study: Developmental synchronies in behavior. *Child Development* 54:298–316. [JPR]
Winegar, K. (1989) "Trophies" on a pedestal: Younger mate seen as symbol of real success. *Arizona Republic* September:F1–2. [aDTK]
Yin, P. & Shine, M. (1985) Misinterpretations of increases in life expectancy in gerontology textbooks. *The Gerontologist* 25:78–82. [rDTK]