

Marriage: An Evolutionary Perspective

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Abstract

Marriage is universal, and pair bonding is found in other species too with highly dependent young. So marriage functions as a reproductive social arrangement that traditionally involved the extended family. The sexes are not identical in their biological contributions to children's survival, so they seek somewhat different attributes in a mate. Men seek a young, attractive, sexually faithful bride. Women seek a man who is older, taller, and (as in many other species) socially dominant. Both sexes prefer a kind, healthy, attractive, similar mate who is emotionally attached to them. A spouse who fails to maintain sufficiently high mate value is vulnerable to divorce. Infertility and sexual dissatisfaction predict divorce, as does death of a child, but the more children, the stabler the marriage. Cross-cultural data suggest that cruel or subdominant men (e.g., poor providers) and unfaithful women are prone to divorce. Marriages in which the wife dominates the husband in economic contributions, nonverbal behavior, and decision making tend to be less satisfying. In societies in which wives are economically independent of husbands, divorce rates are high. As women's economic power has risen with industrialization, divorce rates have climbed. Economic and fitness considerations also help explain cultural differences in polygyny, age at marriage, arranged marriage, concern with the bride's sexual chastity, and marriage ceremonies. Other factors also affect marital dynamics, such as state subsidies to families, the sex ratio, and influence of the couple's parents.

The purpose of this article is to present a brief survey of theory and research on marriage. Quale, in her *History of Marriage Systems* [1], characterized this topic as follows:

This is a worldwide history of marriage systems. It goes back to the earliest generations of human life to seek the roots of why and how human beings came to marry, to form lasting, mutually helpful offspring-raising relationships... (p. xi).

Quale's focus on the raising of offspring is consonant with the evolutionary perspective. Evolutionists have recognized that marriage is a human universal and therefore probably has an evolved basis. This conclusion is confirmed by evidence that hormones play a role in the capacity for amorousness [2, 3]. To understand the function of marriage, evolutionists have noted that other species also form adult male-adult female associations that raise young together. Thus, the function of this pair-bonding behavior was hypothesized to be to raise young with the aid of the father as well as of the mother. Pair bonding evolved to keep the father socially attached to the mother so that he would be positioned to help with parental care and to ensure his paternity of his mate's offspring. This functional hypothesis has been confirmed by the observation that pair bonding tends to occur in species with highly dependent young – young that usually require the efforts of both parents to enhance survival [4]. Indeed, children's development is enhanced in every conceivable way by being raised by both biological parents rather than by any other combination [5]. Children of stepparents are at elevated risk of abuse, neglect, low parental investment, and even homicide [6]. Consistent with the notion that human pair bonding has an evolved basis, hormones contribute not only to maternal care [7–10], but also to paternal care. Men, like males of other pair-bonding mammalian species, undergo a rise in prolactin, which promotes parental care, when their mates are pregnant [11].

This biologically functional approach stands in contrast with the perspective of most social scientists, who view marriage as a social or economic partnership of attempted self-fulfillment. This hedonistic view of marriage is especially prominent among U.S. marriage researchers [12]. A content analysis of recent journal articles on marriage reveals that the leading U.S. marriage journal contained many articles on marital satisfaction, whereas journals that covered mar-

riage, among other topics, in non-Western societies had none at all (Table I). A follow-up additional analysis of the content of Spanish-language marriage journals revealed only one article on marital satisfaction.

We believe that this difference in journal content reflects societal differences in viewing marriage. The U.S. is a highly individualistic society in which personal happiness is of great, even paramount, concern. By contrast, more collectivistic societies consider the family to be a social vehicle for nurturing all family members, not just the children but the married couple's parents as well. The U.S. stands at perhaps the extreme point in stressing individual happiness rather than successful child rearing and harmonious relations within the extended family [1, 13].

The mainstream social science literature on marriage, especially in the U.S., focuses on correlates of marital satisfaction and stability. This literature has led to some important conclusions. Marriages tend to be contracted between neighbors and individuals of similar background. Marital satisfaction and stability are correlated with similarity, income, education, health, sexual satisfaction, sexual fidelity, not being parents before marriage, mutual respect and affection, duration of courtship, and age at marriage [14]. Missing from these conventional analyses is a theoretical explanation for why these factors should be important, and especially of why marriage occurs in all human societies. These analyses are also highly culture-bound. For example, an emphasis on spousal companionship would be of relatively little concern in polygynous marriages, in which there is more interest in reproduction [1]. Another shortcoming is a de-emphasis on sex differences in factors in mate choice and marriage maintenance. But the main limitation seems to be a disinclination to consider biological factors that affect reproductive success. Marriage is a reproductive adaptation. Couples that failed to reproduce successfully would have been selected out, along with their marital values and behavior.

We believe that a cross-cultural, cross-species, functional approach can be fruitful in understanding marriage and the family. By viewing marriage as a form of pair bonding, insight can sometimes be gained into why human couples behave as they do. So we begin with a brief discussion of how marriage evolved. Many scenarios have been offered for this evolutionary transition from the mainly promiscuous proclivities of our chim-

Table I. Content Analysis of Research on Marriage in Five Journals in the 1990s.

Journal Title	Marriage	Marital Satisfaction	Marriage & Extended Family
J of Modern African Studies	30	0	2
Modern Asian Studies	57	0	6
J of Latin American Studies	23	0	2
Comparative Studies in Sociology & History	74	0	6
J of Marriage & the Family	200	148	107

Source: JSTOR

panzee-like ancestors to the pair bonding that arose in the hominid line [e.g., 15, 16]. Suffice it to say for our purposes that human pair bonding became evolutionarily stable because it enhanced certainty of paternity, thereby rewarding paternal effort, and because the labors of husband and wife complemented each other. The husband hunted game and defended the family; the wife gathered plant food and nursed the children. Recently the role of the couple's parents has received attention from functionalists. In traditional cultures, grandparents and other family members provide important support to the parents and grandchildren. This multiplication of caretakers is thought to have been responsible for the unusually low inter-birth interval of humans, their high rate of child survival, and their consequent extraordinary success as a primate species [e.g., 15, 17]. Another recent development is Miller's [18] idea that intelligence and artistic ability were sexually selected in hominids, leading to strong selection pressure for those aptitudes and the appreciation thereof. Miller and others have also suggested that the emotions that surround pair bonding behavior, such as feelings of jealousy and infatuation, offer clues to our hominid mating strategies.

In this article we will attempt a brief evolutionary analysis of these aspects of marriage: criteria of mate choice, occurrence of divorce, variations in marriage across cultures, and modern trends in marriage.

Criteria of Mate Choice

The problem faced by the prospective parent is to find and keep a mate who will contribute maximally to one's own reproduction. However, to attract such a mate, one must offer appealing mate qualities oneself. These considerations help account for the fact that spouses tend to be similar in physical attractiveness, intelligence, and other salient background factors. Presumably, spouses are usually similar in mate value [18, 19]. Spouses also tend to be similar in background factors, thus presumably enhancing compatibility. Courtship consists in part of assessing the degree of similarity, in that less similar couples tend to break up [reviewed in 20].

However, spouses also are similar in seemingly irrelevant but highly heritable traits, such as eye color and height. In order to understand why spouses tend to be genetically similar, it is necessary to note that this is true of other species as well, including some insects, birds, and simians [21]. (Extreme genetic similarity is avoided because of inbreeding depression effects, but moderate similarity is sought.) Consequently, a very general functional explanation must be invoked. Various explanations have been offered. The offspring of moderately similar parents may have especially high fitness. The rate of miscarriage in such marriages is relatively low [22], and cousin marriages sometimes have especially high fertility [23]. This benefit of homogamy (or positive assortative mating) may occur through preservation of adaptive gene combinations. Another possibility is that the offspring of similar, or

homogamous, parents will share more genes with the parent, thereby providing a boost in passing on one's genes. A related possibility is that sibling cooperation would be greater with closer consanguinity between siblings. In any case, humans seem to exhibit a preference for mates of moderate genetic similarity in various cultures, including contemporary forager cultures [24]. This preference is mediated in part by pheromones [25] but also by cultural rules of exogamy/endogamy [23]. Sexual aversion to first-degree kin develops through proximity during childhood, and recent data suggest that this aversion may be pheromonally mediated [26].

Some additional mate selection criteria are the same for males and females. Both sexes seek a healthy, reproductively competent, kind mate who is emotionally bonded to them [27]. Full sex differentiation is a sign of reproductive maturity and competence; accordingly, both sexes prefer mates who are somewhat more sexually differentiated than average [28]. Both sexes seek signs of genetic quality, i.e., physical attractiveness.

However, some mate choice criteria differ systematically between the sexes. Ultimately, this is because the sexes contribute somewhat differently to their common offspring. Men seek a young bride, who will have all of her reproductive years ahead of her [27]. Women in traditional societies usually marry about the time fertility begins [28]. Their reproductive value is highest then, and so, presumably, is their mate value. Women, on the other hand, seek a man who is a few years older than they [27]. Men continue to be fertile after their wives have reached menopause, so women need be little concerned with their husband's declining fertility. But why should women prefer an older husband? This preference is actually stronger than men's preference for a younger wife. The usual explanation is that older men are wealthier, and women seek the economic resources of a wealthy man. A more comprehensive explanation may be that age is a sign of social dominance, and women, like females of many other species, seek dominant males. This interpretation is supported by the fact that women seek dominance in men even when dominance is defined in terms other than economic ones. Women tend to prefer a taller, more athletic, more self-assured, socially dominant man who exhibits nonverbal signs of dominance [28]. Dominance is generally a sign of superiority over male competitors and would have been a useful indicator of potential as a provider and protector in hominid evolution, and probably a more compelling indicator than culturally defined and variable indicators of wealth such as ownership of many cattle. However, indications of wealth or earning power presumably came to be sought, and were selected for on a cultural basis. Similarly, industriousness and skill at women's tasks are generally sought in a bride. Marriage is in part an economic partnership, and individuals would be well advised, as they often are by their parents, to seek an economic contributor in a spouse. But marriage is much more than an economic partnership. Economic

resources are important to the success of a marriage, but apparently because they enhance the survival of children. In functional terms, resources are a means to the end of reproductive success.

Marriage Maintenance

Mate choice continues after the marriage begins. Divorce or abandonment is always theoretically possible, and it would pay for spouses to consider that option. The predictors of divorce tend to make adaptive sense and, consequently, resemble the criteria of mate choice. Cross-cultural surveys have identified these factors as important in divorce: infertility, refusing sex, sexual infidelity especially by the wife, cruelty especially by the husband, and economic failure especially by the husband [29]. (Note the close parallels to mate choice criteria such as apparent fertility, kindness, emotional commitment, and male dominance.) In no society can men marry if they cannot afford to do so, and destitute men seldom remain married for long. In most societies studied (e.g., Turkey, the U.S., England, Sweden, Australia), marriages in which the husband is moderately dominant in decision making are happiest [30–33]. Marriages in which the wife dominates the husband in nonverbal behavior when the two interact tend to be the least satisfactory [31, 34, 35]. Perhaps the most objective and truest measure of a mate's desirability is reproductive success itself. Accordingly, infertility is an acceptable grounds for divorce in many cultures, and around the world the likelihood of divorce declines with increasing fecundity [36]. Divorce is also more likely in the event of sexual difficulties, rape [37], or death of a child [38]. Finally, societies in which the labor of husband and wife are interdependent, so that neither could thrive economically without the other, tend to have low divorce rates [39]. In light of this, the modern trends toward obliteration of sex role division of labor and toward purchasing what formerly were domestic services may bode ill for the future of marriage.

The frequency and timing of divorce can also be fruitfully interpreted in functional terms. In traditional societies, divorce is fairly rare – about equal to that in the U.S. in the 1950s [40]. One may seek another spouse, but in doing so, one must expend mate search time that might otherwise be utilized in reproduction. Also, if divorce has occurred after the birth of children, one's mate value has declined and one may have difficulty finding a suitable new spouse; this is especially true for women. Furthermore, parental assistance from the father will be less available, and assistance from a stepparent will probably be much less valuable. Accordingly, divorce disproportionately occurs early in marriage when there are few if any children [41]. The peak in divorce at around four years into marriage [42] may be explained in proximate terms by a waning of infatuation after 2 or 3 years into a romantic relationship [43]. This decline in amorousness may be adaptive in allowing dissolution of a marriage that has been barren, and alternatively in allowing couples with a child to divert

more emotional investment away from each other and toward their helpless infant. The marriage will then be sustained partly by the parents' attraction to their infant.

Variation in Marriage Across Cultures

Armed with this functional perspective, we can proceed to try to understand some of the variable forms that human marriage takes. About 14% of marriages occur in matrilineal societies [23]. Most of these practice the avunculate, meaning that a woman's brother plays a major parental role for her children. Infidelity is generally common, so that men have little certainty of paternity for their wife's children. Consequently, most men invest mainly in their sisters' children, who they can be certain are their blood kin. Because of infidelity and low paternal investment, divorce rates are high. Thus, this variant on the usual patrilineal form of the family makes functional sense. Matrilineality tends to arise in societies in which women cooperate across generational lines to a high degree, which favors matrilineality, and in which men leave for long periods on warmaking expeditions and thus risk cuckoldry. By contrast, patrilineality is associated with patrilineality, which in turn is the rule where kinsmen cooperate in herding, farming, or fighting [1].

Another important economic factor for explaining variability in marriage is wealth. In societies where some men can afford more than one wife at a time, polygyny usually arises [23]. Even in modern societies in which the Christian tradition has rendered polygyny illegal, wealthy men sometimes petition for divorce and then remarry [44, 45]. Such cases of "serial polygyny" are more likely if the husband is still relatively young [46]. Similarly, in many birds, a male that commands a large territory often attracts multiple mates. A female may do better sharing a prosperous male than monopolizing a single but destitute one. Women in polygynous marriages tend to have almost as many surviving children as women in monogamous ones in the same society [47]. Male wealth also affects how marriages are contracted. Arranged marriage, the usual form in traditional societies, is associated with large bride prices [1]. Parents care about the transfer of wealth and also about establishing political and economic alliances with other families through marriage. Parents employ various tactics to maintain control over their children's amorous inclinations, including sex segregation, claustration of women, veiling of women, early marriage, and condemnation of premarital sex. (After marriage, wives are often controlled sexually by surveillance by patrilocal kin and other measures.) However, in no society do parents succeed completely in overriding their children's mate preferences. Arranged marriage is unusual in forager societies, the economic form of our hominid ancestors, so we can assume that young people would have evolved strong and elaborate mate choice criteria of their own, as certainly seems to be the case. Marriages are usually arranged in societies with appreciable bride prices; parents have an economic stake

in the outcome. Bride price or bride service occurs in about 71% of cultures, especially patrilineal ones [48]. Where property stakes are high at marriage, prospective brides will maximize their mate value by enhancing their apparent sexual fidelity. In these societies, genital mutilation (and, very rarely, dowry) sometimes occur, presumably to sweeten the pot for a rich suitor [1]. Genital mutilation is viewed as a means of reducing a woman's sexual desire and thus her tendency to sexual infidelity [23]. It is a remarkable testament to the importance of paternity certainty that families would submit their daughters to this gruesome and often lethal operation. Then again, sexual jealousy is the most common cause of murder around the world [49].

Economic factors also affect the age of marriage. Men must meet an economic test in order to marry, and in societies in which many years are needed to accumulate the skills or property in order to qualify, marriage is delayed. During prosperous times, men's age at marriage tends to fall [1]. On the other hand, men marry early where their economic skills develop early, as among farmers and laborers in contemporary society. To some extent, women's age at marriage tracks men's in the society. Divorce rates tend to be higher when the age gap between spouses is great. However, women always marry at younger average ages than men. This is because of men's need for time to become dominant economically and interpersonally, and because of women's more sharply declining fertility with age. Where women are in short supply, men tend to marry late because they require more time to qualify economically. Women, on the other hand, usually marry when young, as soon as they become marriageable. For example, women tend to marry at earlier ages in polygynous societies than in monogamous ones, because they are more in demand in the former. Lastly, when life expectancies are short, marriage occurs early, just as short-lived animals begin to reproduce at young ages.

Public marriage ceremonies occur in the majority of traditional societies, especially where bride prices are high [1]. A public marriage commitment tends to lower the likelihood of divorce. Also, at marriage ceremonies the two families become acquainted and often establish economic or alliance ties that they would lose in the event of a divorce. Alliances are especially important as a consideration in marriage arrangements in feudal societies in which defense depends greatly on strength of number.

Trends in Modern Marriage

The Industrial Revolution brought profound changes in marriage and the family. Some of these trends continue today. With industrialization, husbands often moved their families to cities to take factory jobs [1]. They usually left their parents and other relatives behind, on the family farm, and became less committed to the financial support of those now distant kin. Wives also sometimes took factory jobs, thus distanc-

ing themselves from their children who, in turn, spent many hours away from home while being schooled for the technical jobs required by industry. In short, family members became most distant from one another. Arranged marriage began to die out. Perhaps because of this isolation of the nuclear family from other relatives and weakened ties to in-laws and because spouses met lovers at work, divorce rates began to rise. A steady rise in divorce has occurred wherever industrialization has taken place [36].

In recent decades disintegration of the family has continued, especially in the U.S. [50]. Divorce rates in the U.S. are about triple those in Western Europe, probably in part because of the strong individualism ethic noted previously. A survey found that U.S. and British couples were very similar in values except that the former placed greater importance on individual self-fulfillment and the latter on having a good marriage [51]. More and more U.S. women with young children are working outside the home. Contact hours between parents and children are declining [50]. "Reform" of the welfare system has resulted in even less contact with children as mothers are obligated to have full-time jobs. Adolescent girls often drop out of school to stay home with their younger siblings while the mother is at work, a phenomenon now referred to as the no-parent family.

In Europe the availability of paid parental leave allows most mothers to remain at home with their young infants, and with universal health care mothers can work part-time without losing medical coverage. Some European countries also offer financial incentives for couples to care for aged relatives in the home, thus keeping extended families intact.

However, the low birth rate in these prosperous societies, referred to as the demographic transition, is mystifying. One possible explanation is that parturient women evolved a tendency to evaluate their prospects for raising their newborn successfully. This judgment is made on the basis of the newborn's perceived viability and the availability of assistance from other caretakers. Unmarried, impoverished girls are at elevated risk to abandon or kill a newborn. However, the absence of additional family members due to the breakdown of the extended family may also trigger an aversion to raising children, thereby contributing to the demographic transition [52]. Even when both parents are present, marital satisfaction tends to decline with the birth and development of children, and recovers when the children grow up and leave home [53, 54]. However, this seems to occur only in Western societies such as the U.S., England, and Sweden. It has not been observed in more collectivistic societies with stronger extended-family relationships, Turkey and China [12, 55]. Consistent with the suggestion [52] that the demographic transition reflects breakdown of the extended family, marital satisfaction in Western and Eastern societies seems to depend more on relations with the couple's parents than on the impact of children [56].

Divorce rates continue to rise in all industrialized societies. Another factor is the increased earning power

of women. It is a troubling but well-established fact that divorce rates are high where women are economically independent of their husbands. This is true of traditional societies and modern ones [reviewed in 28]. Husband's income stabilizes marriage, whereas wife's income usually destabilizes it, especially if her income rivals or exceeds his [57]. Similarly, women are seldom willing to marry a man who earns less than they do. High-income women desire a high-income man more strongly than do low-income women, despite being less needy themselves [58, 59]. Marriage is not a simple economic partnership in which marital success is correlated with family income; marital success depends greatly on which spouse earns how much.

Nowhere are these dynamics more apparent than in the African American population. The vast majority of Black births are to unwed mothers. Black adolescent girls may be realistic in despairing of finding a marriageable man, and proceeding to get pregnant and deliver without the aid of a husband [60]. Many black men are effectively unmarriageable because they are poor, imprisoned, alcoholic, mentally ill – or homicide victims. Black women now gain far more education than Black men. The remedy advocated by Wilson [60] is to offer well-paying jobs to impoverished men of any race so they can help support a family. One would, of course, want to make similar jobs available to women too, but these would not strengthen families without concomitant paid parental leave. The availability of marriageable men would indirectly benefit women economically by making marriage more accessible for those who sought it. Women, like men, would have more options in balancing work and family life. Marriage benefits all family members, not just children. People are generally healthier and happier being married [61]. Married men are less prone to alcoholism, mental illness and criminality, including rape, than single men.

It is important to emphasize that these mating dynamics of Blacks are a special case only because of the extraordinary dearth of marriageable Black men. The same effects have occurred in other populations when men are in short supply, such as following military defeat [36]. Where men are scarce, marriage rates fall and sexual promiscuity increases because men can get sex without marriage. Where women are scarce, their rate of marriage tends to be high. Another consequence of a low marriage rate is that sibling relations tend to be more acrimonious between half-siblings and stepsiblings than between full siblings, who are more closely related genetically [62].

In attempting to compensate for the decline in the family, the welfare state may actually undermine marriage by offering incentives to reproduce outside of marriage. The availability of generous child care allowances for unwed mothers has been shown to increase the likelihood of carrying a fetus to term as opposed to getting an abortion [63]. In effect, the state competes with men to assume the paternal role. However, fathers offer more than just economic assistance to children. Cross-culturally, the father typically serves as a protec-

tor of the family, an adult model, a playmate especially for weanlings, and a tutor of the sons in masculine pursuits [64]. It seems obvious that family law needs to take each family member into account. Failure to do so can lead to results such as that observed in Czechoslovakia around 1980. State-provided benefits lowered the average age of marriage, but this in turn raised the divorce rate [1].

In sum, it seems that deviation from the species-typical pattern of the extended family can be perilous. In traditional cultures, extended families invariably reside together – if not under the same roof than within easy walking distance. This means that children are raised by multiple kin, and spouses are not solely dependent on each other for emotional and practical support. Grandparents can offer not only tangible assistance such as child care, but also advice on resolving marital difficulties – or advice to terminate a marriage. We found that in the U.S., England, China, and Turkey parental approval of the child's choice of a spouse was associated with marital love [56, 65]. If, however, the couple's parents divorce, their assistance is less feasible and their advice more suspect. Couples with divorced parents are more likely to divorce themselves, so that marital success is passed on across generations. This is true in another sense as well, since the tendency to divorce has appreciable heritability [66]. Thus, even if we have abandoned arranged marriage – which, indeed, usually results in less satisfaction than free-choice marriage – we may still benefit from the advice and involvement of the extended family. A network of kin not only provides emotional security and tangible assistance, it also allows young people to learn how to be parents themselves by observing loving parental care by their elders [67]. In this way too, successful family relations can be passed on.

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REFERENCES

- 1 Quale GR. A history of marriage systems. New York: Greenwood; 1988.
- 2 Higham E. Variations in adolescent psychohormonal development. In: Adelson J, editor. Handbook of adolescent psychology. New York: Wiley; 1980.
- 3 Richards MH, Larson R. Pubertal development and the daily subjective states of young adolescents. *J Research on Adolescence* 1993; **3**:145–169.
- 4 Baker RR, & Bellis MA. Human sperm competition: copulation, masturbation and infidelity. London: Chapman & Hall; 1995.
- 5 Amato PR. Children's adjustment to divorce: Theories, hypotheses, and empirical support. *J Marriage & Family* 1993; **55**:23–38.

- 6 Daly M, Wilson M. Homicide. Hawthorne (N.Y.): Aldine de Gruyter; 1988.
- 7 Fleming AS. Hormonal and experiential correlates of maternal responsiveness. In: Krasnegor NA, Bridges, RS, editors. Mammalian parenting: biochemical, neurobiological, and behavioral determinants. New York: Oxford University Press; 1990.
- 8 Goldberg S, Blumberg SL, & Kriger A. Menarche and interest in infants: biological and social influences. *Child Development* 1982; **53**:1544–1550.
- 9 Money J, Ehrhardt AA. Man and woman, boy and girl. Baltimore (Md.): Johns Hopkins University Press; 1972.
- 10 Warren MP, Shortle B. Endocrine correlates of human parenting: A clinical perspective. In: Krasnegor NA, Bridges RS, editors. Mammalian parenting: biochemical, neurobiological, and behavioral determinants. New York: Oxford University Press; 1990.
- 11 Storey AE, Walsh CJ, Qutinton RL, Wynne-Edwards KE. Hormonal correlates of paternal responsiveness in new and expectant fathers. *Evolution & Human Behavior* 2000; **21**:79–95.
- 12 Weisfeld CC, Weisfeld GE, Lucas TW Pardo-Rincon Y, Parkhill MR. What's important – marital satisfaction or reproductive success? Paper presented at the congress of the International Society for Human Ethology, Montréal; August 2002.
- 13 Brislin, R. Understanding culture's influence on behavior. New York: Harcourt; 2000.
- 14 Brehm SS, Miller RS, Perlman D, Campbell SM. Intimate relationships (3rd ed.). New York: McGraw Hill; 2002.
- 15 Hrdy SB. Mother nature: a history of mothers, infants, and natural selection. New York: Pantheon; 1999.
- 16 Schlegel A. The origin of the family. Paper presented at the convention of the Human Behavior and Evolution Society, New Brunswick (N.J.); June 2002.
- 17 Zeller AC. A role for children in hominid evolution. *Man* 1987; **22**:528–557.
- 18 Miller G. The mating mind. London: Vintage; 2001.
- 19 Mealey L. Sex differences: developmental and evolutionary strategies. New York: Academic Press; 2000.
- 20 Weisfeld GE, Russell RJH, Weisfeld CC, Wells PA (1992). Correlates of satisfaction in British marriages. *Ethology & Sociobiology* 1992; **13**:125–145.
- 21 Andersson M. Sexual selection. Princeton (N.J.): Princeton University Press; 1996.
- 22 Rushton JP. Genetic similarity, mate choice, and fecundity in humans. *Ethology & Sociobiology* 1988; **9**:329–333.
- 23 van den Berghe PL. Human family systems: an evolutionary view. New York: Elsevier; 1979
- 24 Coon CS. The hunting peoples. Boston: Little, Brown; 1971.
- 25 Jacob S, McClintock MK, Zelano B, Ober C. Paternally inhibited HLA alleles are associated with women's choice of male odor. *Nature Genetics* 2002; **30**:175–179.
- 26 Czilli T, Weisfeld GE, & Lichtman C. Recognition of parents, children, and siblings by olfaction. Paper presented at the congress of the International Society for Human Ethology, Montréal; 2002.
- 27 Buss DM. Sex differences in human mate preferences: Evolutionary hypotheses tested in 37 cultures. *Behavioral & Brain Sciences* 1989; **12**:1–49.
- 28 Weisfeld GE. Evolutionary principles of human adolescence. New York: Basic Books; 1999.
- 29 Betzig, L. Causes of conjugal dissolution: a cross-cultural study. *Current Anthropology* 1989; **30**:654–676.
- 30 Corrales RG. Power and satisfaction in early marriage. In: Cromwell RE, Olson DM, editors. Power in families. New York: Wiley; 1975.
- 31 Gray-Little B, Burks N. Power and satisfaction in marriage: a review and critique. *Psychological Bulletin* 1983; **93**:513–538.
- 32 Kotlar SL. Middle-class marital role perceptions and marital adjustment. *Sociology & Social Research* 1965; **49**:283–294.
- 33 Shen J, Wendorf C, Lucas T, Parkhill M. Correlates of satisfaction in Chinese marriages. Poster presented at the congress of the International Society for Human Ethology, Montréal; August 2002
- 34 Noller P. Nonverbal communication and marital interaction. Oxford: Pergamon Press; 1984.
- 35 Schell NJ, Weisfeld CC. Marital power dynamics: a Darwinian perspective. In: van der Dennen JMG, Smillie D, Wilson DR, editors. The Darwinian heritage and sociobiology. Westport (Conn.): Praeger; 1999.
- 36 Goode WJ. World changes in divorce patterns. New Haven (Conn.): Yale University Press; 1993.
- 37 Thornhill R, Thornhill N. Human rape: an evolutionary analysis. *Ethology & Sociobiology* 1983; **4**:63–99.
- 38 Littlefield CH, Silverman I. Marital dissatisfaction following the death of a child: The influence of genetic factors at cause in the death. *J Marriage & Family* 1991; **53**:799–804.
- 39 Friedl E. Women and men: an anthropologist's view. New York: Holt, Rinehart & Winston; 1975.
- 40 Stephens WN. The family in cross-cultural perspective. New York: Holt, Rinehart & Winston; 1963.
- 41 Brown NM, Amatea ES. Love and intimate relationships: journeys of the heart. New York: Brunner/Mazel; 2000.
- 42 Fisher H. The anatomy of love: the mysteries of mating, marriage, and why we stray. New York: Fawcett Columbine; 1992.
- 43 Tennov D. Love and limerence: the experience of being in love (2nd ed.). Lanham (Md.): Scarborough House; 1999.
- 44 Buckle L, Gallup GG, Rodd ZA. Marriage as a reproductive contract: patterns of marriage, divorce, and remarriage. *Ethology & Sociobiology* 1996; **17**:363–377.
- 45 Gottman JM, Levenson RW. The timing of divorce: Predicting when a couple will divorce over a 14-year period. *J Marriage & Family* 2000; **62**:737–745.
- 46 Hiedermann B, Rand OO, Source AM. Economic independence, economic status, and empty nest in midlife marital disruption. *J Marriage & Family* 1998; **60**:219–231.
- 47 Daly M., Wilson M. Sex, evolution, and behavior (2nd ed.) Belmont (Calif.): Wadsworth; 1983.
- 48 Murdock GP. Ethnographic atlas. Pittsburgh, Pa.: University of Pittsburgh Press; 1967.
- 49 Freedman DG. A biological view of man's social behavior. In: Etkin W, editor. Social behavior from fish to man. Chicago: University of Chicago Press; 1967.
- 50 Popenoe D. American family decline, 1960–1990: a review and appraisal. *J Marriage & Family* 1993; **55**:527–555.
- 51 Perkins HW, Spates JL. Mirror images? Three analyses of values in England and the United States. *International J Comparative Sociology* 1986; **27**:31–51.
- 52 Waynforth S, Waynforth D. Minding the baby and demographic transition. Paper presented at the convention of the Human Behavior and Evolution Society, New Brunswick (N.J.); June 2002.
- 53 Argyle M., Henderson, M. The anatomy of relationships. Harmondsworth (England): Penguin; 1985.
- 54 Stattin H, Klackenber G. Discordant family relations in intact families: developmental tendencies over 18 years. *J Marriage & Family* 1992; **54**:940–956.
- 55 Pimentel EE. How do I love thee? marital relations in urban China. *J Marriage & Family* 2000; **62**:32–47.
- 56 Wendorf CA, Imamoglu EO, Shen J, Weisfeld GE, Lucas TW. Marriage within the extended family in four cultures. Paper presented at the congress of the International Society for Human Ethology, Montréal; August 2002.
- 57 Cready DM, Fosset MA, Kiecolt KJ. Mate availability and African American family structure in the U.S. metropolitan South, 1960–1990. *J Marriage & Family* 1997; **59**:192–203.
- 58 Townsend JM. Mate selection criteria: a pilot study. *Ethology & Sociobiology* 1989; **10**:241–253.
- 59 Wiederman MW, Allgeier ER. Gender differences in mate selection criteria: Sociobiological or socioeconomic explanation? *Ethology & Sociobiology* 1992; **13**:115–124.

- 60 Wilson WJ. The truly disadvantaged. Chicago: University of Chicago Press; 1987.
- 61 Argyle M. The psychology of happiness (2nd ed.). New York: Taylor & Francis; 2001.
- 62 Weisfeld GE, Aytch DM. Biological factors in family violence. *Michigan Family Review* 1996; **2**:25–39.
- 63 Chilman CS. Some psychological aspects of adolescent sexual and contraceptive behaviors in a changing American society. In: Lancaster J & Hamburg BA, editors. *School-age pregnancy and parenthood: biosocial perspectives*. New York: Aldine de Gruyter; 1986.
- 64 Mackey W C. *The American father: biocultural and developmental aspects*. New York: Plenum; 1996.
- 65 Weisfeld GE, Weisfeld CC, Imamoglu EO, Wendorf CA. Cultural differences in the impact of number of children on marital satisfaction. Paper presented at the convention of the Human Behavior and Evolution Society, London; June 2001.
- 66 McGue M, Lykken DT. Genetic influence on the risk of divorce. *Psychological Science* 1992, **3**:368–373.
- 67 Richer J. The rise of psychosocial problems, attachment and mismatch. Paper presented at the congress of the International Society for Human Ethology, Montréal; August 2002.