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Sex differences in human mate preferences: Evolutionary hypotheses tested in 37 cultures

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Abstract: Contemporary mate preferences can provide important clues to human reproductive history. Little is known about which characteristics people value in potential mates. Five predictions were made about sex differences in human mate preferences based on evolutionary conceptions of parental investment, sexual selection, human reproductive capacity, and sexual asymmetries regarding certainty of paternity versus maternity. The predictions centered on how each sex valued earning capacity, ambition–industriousness, youth, physical attractiveness, and chastity. Predictions were tested in data from 37 samples drawn from 33 countries located on six continents and five islands (total $N = 10{,}047$). For 27 countries, demographic data on actual age at marriage provided a validity check on questionnaire data. Females were found to value cues to *resource acquisition* in potential mates more highly than males. Characteristics signaling *reproductive capacity* were valued more by males than by females. These sex differences may reflect different evolutionary selection pressures on human males and females; they provide powerful cross-cultural evidence of current sex differences in reproductive strategies. Discussion focuses on proximate mechanisms underlying mate preferences, consequences for human intrasexual competition, and the limitations of this study.

Keywords: assortative mating; cultural differences; evolution; mate preferences; reproductive strategy; sex differences; sexual selection; sociobiology

1. Introduction

Mate preferences acquire importance in at least three scientific contexts. First, they can affect the *current direction* of sexual selection by influencing who is differentially excluded from and included in mating (Darwin 1871). Favored mate characteristics that show some heritability will typically be represented more frequently in subsequent generations. Individuals lacking favored characteristics tend to become no one's ancestors (Thornhill & Thornhill 1983). Second, current mate preferences may reflect *prior* selection pressures, thus providing important clues to a species' reproductive history. Third, mate preferences can exert selective pressures on other components of the mating system. In the context of intrasexual competition, for example, tactics used to attract and retain mates should be strongly influenced by the mate preferences expressed by members of the opposite sex (Buss 1988). Because of the powerful reproductive consequences of preferential mating, it is reasonable to assume that mate preferences will depart from randomness and evolve through sexual selection (Darwin 1859; 1871; Fisher 1930). This assumption, first advanced by Darwin, has been documented empirically for a variety of nonhuman species (e.g., Bateson 1983; Majerus 1986).

In spite of the importance of mate preferences, little is known about precisely which characteristics in potential mates are valued by human males and females (Buss 1985; Thiessen & Gregg 1980). Particularly lacking are good cross-cultural data. Cross-cultural studies become crucial for testing evolution-based hypotheses that posit species-typical or sex-typical mate preferences. Recent theoretical work by Trivers (1972), Williams (1975), Symons (1979), and Buss (1987) provides a foundation from which specific evolutionary hypotheses about mate preferences can be derived. [See also multiple book review of Symons's *Evolution of Human Sexuality*, BBS 3(2) 1980 and Hartung's "Matrilineal Inheritance" *BBS* 8(4) 1985.]

1.1. Predictions from parental investment and sexual selection theory

Trivers (1972) posits that sexual selection is driven in part by different levels of investment by males and females in their offspring (Bateman 1948). In humans and other mammals, male parental investment tends to be less than female parental investment (Fisher 1930; Trivers 1972; Williams 1975). Mammalian fertilization occurs internally within females, as does gestation. A copulation that requires minimal male investment can produce a 9-month investment by the female that is substantial in terms of time, energy, resources, and foreclosed alternatives.

Investment, of course, does not begin with fertilization, nor does it end with parturition. Trivers describes

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several forms of male investment. Males may provide mates with food, find or defend territories, defend the female against aggressors, and feed and protect the young. Human males may also provide opportunities for learning, they may transfer status, power, or resources, and they may aid their offspring in forming reciprocal alliances. These forms of male investment, when provided, tend to decrease the investment disparities between males and females (Trivers 1972, p. 142).

Trivers's theory proposes that the sex investing more in offspring (typically the female) will be selected to exert stronger preferences about mating partners. This greater choosiness by the more heavily investing sex exists because greater reproductive costs are associated with indiscriminate mating and greater benefits are associated with exerting a choice. The costs of less discriminating mating will be lower for the sex investing less and the benefits will be greater. In species where investment in offspring by males and females is equivalent, the sexes are expected to be equally discriminating in their choice of mating partners (Trivers 1985).

What mate characteristics might be predicted on theoretical grounds in the selection preferences of females? In species with male parental investment, such as *Homo sapiens* (Alexander & Noonan 1979), females should seek to mate with males who have the ability and willingness to provide resources related to parental investment such as food, shelter, territory, and protection. Trivers's prediction should apply only in contexts where resources can be accrued, monopolized, and defended, where males tend to control such resources, and where male variance in resource acquisition is sufficiently high (Emlen & Oring 1977; Trivers 1972). The hypothesis that females will mate preferentially with males bearing greater gifts, holding better territories, or displaying higher rank has been confirmed empirically in many nonhuman species (Calder 1967; Lack 1940; Trivers 1985; see also Betzig et al. 1988).

These resources can provide (a) immediate material advantage to the female and her offspring, (b) enhanced reproductive advantage for offspring through acquired social and economic benefits, and (c) genetic reproductive advantage for the female and her offspring if variation in the qualities that lead to resource acquisition is partly heritable.

Among humans, resources typically translate into earning capacity. This suggests that females will value characteristics in potential mates that are associated with increased earning capacity, such as ambition and industriousness (Barron 1963; Willerman 1979). These premises, combined with conditions of resource defensibility and high variance in male resource acquisition, produce a specific prediction: Females, more than males, should value attributes in potential mates such as ambition, industriousness, and earning capacity that signal the possession or likely acquisition of resources.

1.2. Predictions based on fertility and reproductive value

For males more than for females, reproduction is limited by access to reproductively valuable or fertile mates (Symons 1979; Trivers 1972; Williams 1975). *Reproductive value* is defined actuarially in units of expected future reproduction – the extent to which persons of a given age and sex will contribute, on average, to the ancestry of future generations (Fisher 1930). *Fertility* is defined as the probability of present reproduction. In human females, reproductive value typically peaks in the mid-teens and declines monotonically thereafter with age. Fertility typically peaks in the early 20s and shows a similar decrement with age (Thornhill & Thornhill 1983). The difference between fertility and reproductive value may be illustrated by contrasting two females, aged 13 and 23. The younger female would have higher reproductive value than the older one because, actuarially, her *future* reproduction is expected to be higher. In contrast, the 23-year-old female would be more fertile than the 13-year-old because the current probability of reproduction is higher for the 23-year-old.

Both fertility and reproductive value differ across cultures and are affected by factors such as cultural norms, contraceptive practices, and differences in age-specific mortality. In all cultures, however, female fertility and reproductive value are strongly age-dependent (Williams 1975). Thus, age provides a powerful cue to female reproductive capacity – a cue that can be inferred through physical and behavioral attributes or with veridical use of counting systems.

Males should prefer attributes in potential mates associated with reproductive value *or* fertility, depending on whether males in human evolutionary history have tended to seek long-term or short-term mating partners (Buss 1987; Symons 1979; Williams 1975). Specifically, if males in our evolutionary past have tended to seek short-term mating partners, selection should have favored male preferences for females in their early 20s who show cues that are positively correlated with fertility. If males in our evolutionary past have tended to seek long-term mating partners, selection should have favored preferences for females in their mid-teens who show cues indicative of high reproductive value. Evolutionary theorists differ on which of these hypotheses they judge to be most likely. Symons (1979) argues that males have been selected to find most attractive those females of high reproductive value. Williams (1975), in contrast, predicts a compromise preference between reproductive value and fertility due to the existence of both long-term mating bonds *and* some possibility of divorce and extrapair matings.

Features of physical appearance associated with youth – such as smooth skin, good muscle tone, lustrous hair, and full lips – and behavioral indicators of youth – such as high energy level and sprightly gait – have been hypothesized to provide the strongest cues to female reproductive capacity (Symons 1979; Williams 1975). Sexual attraction and standards of beauty are hypothesized to have evolved to correspond to these features. On this account, males *failing* to prefer females possessing attributes that signal high reproductive capacity would, on average, leave fewer offspring than would males who do prefer to mate with females displaying these attributes.

Female reproductive success, in contrast to male reproductive success, is not as closely linked with obtaining fertile mates. Male fertility, to the degree that it is valued by females, is less steeply age-graded from puberty on than is female fertility and therefore cannot be assessed as accurately from physical appearance. Physical appearance, therefore, should be less central to female mate

preferences than to male mate preferences. These premises lead to specific predictions: Males, more than females, will value relative *youth* and *physical attractiveness* in potential mates because of their links with fertility and reproductive value.

Predicting that males will value physical attractiveness in females because of its association with reproductive capacity does not negate or deny the existence of cultural and other determinants of standards for attractiveness. Ford and Beach (1951) have documented cultural variability in standards for female attractiveness along the dimensions of plump versus slim body build, light versus dark skin, and emphasis on particular features such as the eyes, ears, or genitals. Symons (1979) suggested that regularity of features, proximity to the population average, and association with status might also have an important influence on attractiveness standards (see also Buss 1987).

The predicted sex differences in mate preferences for youth and physical attractiveness, however, are expected to transcend cultural variations and other determinants of beauty standards. The physical and behavioral cues that signal youth and health and are regarded as attractive should be linked with reproductive capacity among human females in all cultures. These sex differences are predicted to be species-typical among *Homo sapiens*, despite cross-cultural variations in absolute age preferences, the presence or absence of counting systems to mark age, or culture-specific criteria for female attractiveness that are not linked with reproductive capacity.

1.3. Prediction based on paternity probability

In mating systems where males invest parentally, selection should favor males who act to insure that their investment is directed toward their own offspring and not the offspring of another male. Sexual jealousy is one mechanism that has been proposed to increase paternity probability (Daly et al. 1982). Male sexual jealousy presumably functions to guard a mate and to dissuade intrasexual competitors, thus lowering the likelihood of alien insemination. Daly et al. (1982) and Daly & Wilson (1988) present compelling evidence that many homicides and much male violence stem from male sexual jealousy.

Another possible paternity probability mechanism is valuation of *chastity* in a potential mate (Dickemann 1981). Males who preferred chaste females in our environment of evolutionary adaptedness, *ceteris paribus*, presumably enjoyed greater reproductive success than males who were indifferent to the sexual contact that a potential mate had with other males. Prior to the use of modern contraceptive devices, chastity of a potential mate would provide a cue to paternity confidence. Assuming some temporal stability to behavioral proclivities, chastity would also provide a cue to the *future* fidelity of a selected mate. A male failing to express such a preference would risk wasting the time and effort involved in courtship and would risk investing in offspring that were not his (Daly & Wilson 1983; Dickemann 1981).

The association between chastity and probability of parenthood, however, shows a sexual asymmetry. In our environment of evolutionary adaptedness, maternity was never in doubt. A female could be sure that her putative children were her own, regardless of the prior sexual experiences of her mate. This sexual asymmetry yields a specific prediction: Males will value chastity in a potential mate more than will females. Evidence limited to a few cultures exists regarding the importance of a mate's lack of prior sexual experience in mate preferences (Borgerhoff Mulder 1988; Dickemann 1981).

It should be noted that this predicted sex difference would be compromised if prior sexual experience by a male provided a cue that signaled diversion of resources away from the female and her offspring (Buss 1988b). To the degree that prior sexual experience by males provides this cue, females should also value chastity in a potential mate.

In sum, three clusters of sex differences in mate preferences were predicted, based on an evolutionary account of differing male and female reproductive strategies. A woman's "mate value" (Symons 1987a) should be determined more by her reproductive capacity. Youth and physical appearance, as powerful cues to this capacity, should be more highly valued by men. Chastity should also be valued because it functions to increase a male's probability of paternity. A man's "mate value" is determined less by fertility and more by the external resources he can provide. Characteristics indicative of one's potential to provide resources, such as earning capacity, ambition, and industriousness, should receive more emphasis in female mate preferences. The following study was designed to test these hypotheses in 37 cultures differing widely in ecology, location, racial and ethnic composition, religious orientation, political inclination, and nature of mating system.

2. Methods

2.1. Samples

Thirty-seven samples were obtained from 33 countries located on six continents and five islands, with a total N of 10,047 (see Table 1). The samples range in mean age from 16.96 (New Zealand) to 28.71 (West Germany), with an overall unit-weighted mean of 23.05. Sample sizes vary from a low of 55 (Iran) to highs of 500 (mainland China), 566 (Taiwan, Republic of China), 630 (Brazil), 1,083 (West Germany), and 1,491 (mainland United States). All samples but one have Ns exceeding 100. The mean sample size for the 37 samples is 272. Obviously, greater confidence can be placed in the results from the large samples; results from all samples are presented for completeness.

The samples obtained cannot be viewed as representative of the populations in each country. In general, rural, less-educated, and lower levels of socioeconomic status are underrepresented, although there are many exceptions, such as the Soviet Estonian, Gujarati Indian, South African Zulu, Venezuelan, and Santa Catarina Brazilian samples. The 37 samples do represent a tremendous diversity of geographic, cultural, political, ethnic, religious, racial, and economic groups; combined, they are the largest ever obtained on mate preferences.

Sampling techniques varied widely across countries. In Estonia, for example, one subsample consisted of all couples applying for a marriage license at a certain location within a given time span, whereas another Estonian subsample consisted of 200 high school students. The

Table 1. *Sample sizes and mean ages*

Sample	Sample size			Age of males		Age of females	
	Total	Male	Female	Mean	SD	Mean	SD
African							
Nigeria	172	117	55	23.36	3.39	21.13	1.38
S. Africa (whites)	128	47	81	20.88	2.17	19.44	1.28
S. Africa (Zulu)	100	52	48	25.30	9.40	23.53	6.18
Zambia	119	70	49	25.67	7.42	22.60	4.17
Asian							
China	500	265	235	23.37	4.87	22.46	5.29
India	247	103	144	30.46	12.46	24.90	10.92
Indonesia	143	88	55	23.52	3.16	22.76	3.19
Iran	55	28	27	24.14	5.14	22.74	5.70
Israel (Jewish)	473	205	268	25.52	4.26	23.29	3.65
Israel (Palestinian)	109	54	55	23.51	3.79	21.50	3.23
Japan	259	106	153	20.05	1.50	19.37	0.88
Taiwan	566	288	278	21.13	1.85	20.54	1.63
European–Eastern							
Bulgaria	269	127	142	22.28	6.16	23.06	7.04
Estonian S.S.R.	303	153	150	19.12	3.50	18.32	2.64
Poland	240	122	118	21.98	1.97	21.44	1.51
Yugoslavia	140	66	74	21.53	1.55	20.72	1.33
European–Western							
Belgium	145	55	90	23.80	6.23	21.38	5.49
France	191	100	91	25.27	7.29	25.83	7.95
Finland	204	55	149	23.87	4.58	24.60	5.29
Germany–West	1083	530	553	28.29	10.81	29.14	12.40
Great Britain	130	46	84	20.87	3.92	21.09	5.38
Greece	132	67	65	20.72	2.50	18.71	1.46
Ireland	122	55	67	19.60	1.50	19.27	1.31
Italy	101	46	55	27.83	5.32	25.96	5.39
Netherlands	417	177	240	22.74	3.86	21.65	3.31
Norway	134	67	67	22.25	4.10	22.46	4.46
Spain	124	44	80	22.89	2.58	22.75	3.59
Sweden	172	89	83	29.79	9.88	26.70	8.20
North American							
Canada (English)	101	56	45	20.89	2.98	23.05	6.84
Canada (French)	105	34	71	26.00	6.32	25.17	8.16
USA (Mainland)	1491	639	852	19.98	3.45	20.37	4.63
USA (Hawaii)	179	66	113	23.79	7.23	22.76	6.20
Oceanian							
Australia	280	78	202	25.06	8.50	23.12	8.38
New Zealand	151	75	76	17.00	0.79	16.92	0.81
South American							
Brazil	630	275	355	22.84	4.59	21.72	4.47
Colombia	139	61	78	25.89	6.76	24.34	6.03
Venezuela	193	95	98	28.07	7.19	28.42	7.19
Summary	10,047	4,601	5,446	23.49	3.01	22.52	2.67

Note: SD = standard deviation.

Venezuelan sample was obtained by contacting every fifth house within each of a series of neighborhoods that varied in socioeconomic class. The South African Zulu sample was rural, and questions were read aloud to some subjects. The West German sample was obtained by mail through newspaper advertisements. The New Zealand samples were drawn from three public high schools, two urban and one rural, with subjects differing widely in socioeconomic level. Many were samples of convenience (e.g., university students) and cannot be viewed as repre-

sentative. The wide variety of sampling techniques used tends to increase the generality of consistent results that do emerge by minimizing the biasing effects of any particular sampling procedure.

Problems were encountered, and data collection proved difficult and time consuming. In Sweden, many couples do not get married, but instead live together without the official marriage certificate. The instruments had to be modified to reflect this cultural difference. In Nigeria, polygyny is practiced, and so questions had to be added to reflect the possibility of multiple wives. In South Africa, data collection was described as "a rather frightening experience" due to the political turmoil and its violent ramifications. In several countries, mailing the data was delayed for many months, pending approval of central government committees. In one country, after data collection was nearly completed, the study had to be terminated because of a failure to obtain official sanction. Data from this country were never received.

In most cases, data were collected by native residents within each country and mailed to the United States for statistical analysis. The original protocols were requested, and in most cases these were sent. In a few cases it proved impossible to send the original protocols. In these cases, the raw data were transcribed onto coding sheets and sent to the United States. Research collaborators were blind with respect to the central hypotheses.

2.2. *Measures*

2.2.1. Factors in choosing a mate. This instrument consisted of three parts. The first part requested biographical data, including age, sex, religion, marital status, number of brothers, and number of sisters. The second section requested information on the age at which the respondent preferred to marry, the age difference the respondent preferred to have between self and spouse, who the respondent preferred to be older (self or spouse), and how many children were desired.

The third section requested subjects to *rate* each of 18 characteristics (e.g., dependable character, sociability, chastity, intelligence) on how important or desirable it would be in choosing a mate. A four-point scale was used, ranging from "3" (indispensable) to "0" (irrelevant or unimportant). The 18 characteristics were drawn from a previously developed instrument used widely within the United States over the past 50 years (Hill 1945; Hudson & Henze 1969; McGinnis 1958). Interspersed among the 18 characteristics were the target variables "good financial prospect," "good looks," "chastity: no previous sexual intercourse," and "ambition and industriousness."

2.2.2. Preferences concerning potential mates. The second instrument was developed from the factor analysis (Buss & Barnes 1986) of an expanded 76-item instrument (Gough 1973). The highest loading items from this factor analysis were included (e.g., religious, kind and understanding, exciting personality), along with several items to test the specific hypotheses about sex differences in mate preferences. Interspersed among the 13 characteristics were the target variables "good earning capacity" and "physically attractive."

In contrast to the rating procedure used in the first instrument, subjects were requested to *rank* each characteristic on its desirability in a mate. The instructional set was as follows:

> Below are listed a set of characteristics. Please *rank* them on their desirability in someone you might marry. Give a "1" to the most desirable characteristic in a potential mate; a "2" to the second most desirable characteristic in a potential mate; a "3" to the third most desirable characteristic, and so on down to "13" for the 13th most desirable characteristic in a potential mate.

In sum, two instruments were used, each containing target variables to test the key predictions. They differed in context (presence of other items) and scaling procedure (rating vs. ranking), permitting a partial test of the generality of the findings across methods.

2.2.3. Translations. Instructions were provided to each research collaborator for translating the two instruments into the appropriate language for their sample. These included the use of three bilingual speakers who, respectively, (a) translated from English to the native language, (b) back-translated from the native language to English, and (c) resolved discrepancies between the first two translators. Instructions were provided to make all terms "sex neutral" in the sense of being equally applicable to males and females. The phrase "physically attractive," for example, could be applied to either sex, whereas "handsome" and "beautiful" were considered sex-linked and were therefore not used.

3. Results

3.1. *Earning potential and ambition–industriousness*

To conserve space, only data from the *rated* variables are presented in tabular form. Discrepancies between parallel tests using the rating and ranking instruments are noted in the text and with asterisks in the tables. Tables presenting the full parallel analyses for the ranking instrument are available from the author on request.

Table 2 shows the means, standard deviations, *t*-tests for sex differences, and significance levels for valuation of the rated variable "good financial prospect" for each of the 37 samples. Samples vary considerably in how much this mate characteristic is valued, ranging from quite high (Indonesia, Nigeria, Zambia) to quite low (South African Zulu, Netherlands, Great Britain). In general, South American, North American, Asian, and African samples valued earning capacity more than did Western European samples, although there are important variations among samples within each continent.

In 36 of 37 samples, the predicted sex difference emerged – females valued "good financial prospect" in a potential mate more highly than males did. The sole exception was the sample from Spain, which showed the predicted direction of the sex difference, but not significantly so. The ranked variable "good earning capacity" similarly did not show a significant sex difference for the Spanish sample. Whether this lack of significant sex difference is due to particulars of the Spanish mating system, features of the broader socioecology, or chance sample fluctuation must await replication. In sum, with the exception of the Spanish sample, the predicted sex difference in preferences for mates with good earning

Table 2. *Good financial prospect*

Sample	Males Mean	Males SD	Females Mean	Females SD	*t*-test	Sig.
African						
Nigeria	1.37	0.82	2.30	0.76	−7.00	.000
S. Africa (whites)	0.94	0.78	1.73	0.78	−5.58	.000
S. Africa (Zulu)	0.70	0.87	1.14	0.80	−2.61	.006
Zambia	1.46	0.90	2.33	0.62	−6.35	.000
Asian						
China	1.10	0.98	1.56	0.94	−5.34	.000
India	1.60	0.96	2.00	0.69	−3.63	.000
Indonesia	1.42	0.87	2.55	0.57	−9.46	.000
Iran	1.25	1.04	2.04	0.85	−3.06	.002
Israel (Jewish)	1.31	1.01	1.82	0.87	−5.58	.000
Israel (Palestinian)	1.28	1.05	1.67	0.92	−2.05	.023
Japan	0.92	0.75	2.29	0.58	−15.97	.000
Taiwan	1.25	0.81	2.21	0.70	−15.16	.000
European–Eastern						
Bulgaria	1.16	0.94	1.64	0.91	−4.29	.000
Estonian S.S.R.	1.31	0.86	1.51	0.85	−2.06	.025
Poland	1.09	0.82	1.74	0.80	−6.18	.000
Yugoslavia	1.27	0.76	1.66	0.75	−3.07	.002
European–Western						
Belgium	0.95	0.87	1.36	0.88	−2.74	.004
France	1.22	0.97	1.68	0.92	−3.35	.001
Finland	0.65	0.76	1.18	0.84	−4.10	.000
Germany–West	1.14	0.88	1.81	0.93	−10.19	.000
Great Britain	0.67	0.63	1.16	0.78	−3.65	.000
Greece	1.16	0.95	1.92	0.78	−4.97	.000
Ireland	0.82	0.95	1.67	0.77	−5.51	.000
Italy	0.87	0.69	1.33	0.80	−3.06	.002
Netherlands	0.69	0.81	0.94	0.84	−3.00	.002
Norway	1.10	0.84	1.42	0.97	−2.03	.023
Spain	1.25	0.94	1.39	0.89	−0.80	ns
Sweden	1.18	0.90	1.75	0.75	−4.44	.000
North American						
Canada (English)	1.02	0.82	1.91	0.76	−5.61	.000
Canada (French)	1.47	0.83	1.94	0.63	−3.25	.001
USA (Mainland)	1.08	0.88	1.96	0.82	−20.00	.000
USA (Hawaii)	1.50	0.81	2.10	0.72	−5.10	.000
Oceanian						
Australia	0.69	0.73	1.54	0.80	−8.47	.000
New Zealand	1.35	0.97	1.63	0.75	−2.03	.022
South American						
Brazil	1.24	0.89	1.91	0.78	−9.91	.000
Colombia	1.72	0.90	2.21	0.75	−3.47	.001
Venezuela	1.66	0.96	2.26	0.78	−4.72	.000

Note: Potential mean values can range from 0 (unimportant) to 3 (indispensable). Sig. = significance; ns = not significant.

potential was found across widely varying cultures, typically at a high level of statistical significance.

Table 3 shows analogous results for valuation of "ambition and industriousness." Across both sexes, the Nigerian, Zulu, Chinese, Taiwanese, Estonian, Palestinian, Colombian, and Venezuelan samples placed particularly high value on this mate characteristic. In no sample was ambition–industriousness rated low. Samples from the Netherlands, Great Britain, West Germany, and Finland, however, expressed less preference for this mate characteristic than did other samples.

Thirty-four of the 37 samples (92%) for ambition–industriousness were in the predicted direction, with females expressing a higher valuation than males. In 29

Table 3. *Ambition and industriousness*

Sample	Males Mean	Males SD	Females Mean	Females SD	*t*-test	Sig.
African						
Nigeria	2.25	0.68	2.61	0.56	−3.49	.001
S. Africa (whites)	1.73	0.84	2.16	0.70	−3.14	.001
S. Africa (Zulu)	2.41	0.81	2.10	0.73	2.02	.023
Zambia	1.97	0.92	2.14	0.75	−1.06	ns
Asian						
China	2.22	0.85	2.63	0.59	−6.41	.000
India	1.79	0.86	2.44	0.76	−6.31	.000
Indonesia	1.97	0.73	2.29	0.62	−2.70	.004
Iran	2.68	0.55	2.81	0.48	−0.98	ns
Israel (Jewish)	1.78	0.99	2.43	0.71	−7.66	.000
Israel (Palestinian)	2.28	0.76	2.58	0.71	−2.15	.017
Japan	1.92	0.71	2.37	0.62	−5.53	.000
Taiwan	2.24	0.73	2.81	0.42	−11.31	.000
European–Eastern						
Bulgaria	1.67	0.91	2.15	0.81	−4.63	.000
Estonian S.S.R.	2.31	0.68	2.46	0.64	−2.06	.020
Poland	1.93	0.84	2.29	0.72	−3.49	.001
Yugoslavia	1.82	0.72	2.24	0.74	−3.44	.001
European–Western						
Belgium	1.67	0.82	1.97	0.87	−2.01	.023
France	1.75	1.02	2.00	0.90	−1.79	.037
Finland	1.44	0.83	1.56	0.73	−1.07	ns
Germany–West	1.40	0.81	1.66	0.87	−4.23	.000
Great Britain	1.15	0.70	1.59	0.90	−2.84	.003
Greece	1.96	0.94	2.25	0.90	−1.81	.037
Ireland	1.44	0.88	1.76	0.81	−2.10	.019
Italy	1.63	0.85	2.07	0.94	−2.46	.008
Netherlands	1.28	0.97	1.41	0.93	−1.35	ns
Norway	1.60	0.80	1.70	0.87	−0.72	ns
Spain	1.73	0.90	1.69	0.98	0.22	ns
Sweden	1.97	0.78	2.04	0.76	−0.60	ns
North American						
Canada (English)	1.82	0.69	2.32	0.71	−3.53	.001
Canada (French)	1.79	0.85	2.08	0.75	−1.78	.039
USA (Mainland)	1.84	0.76	2.45	0.61	−16.66	.000
USA (Hawaii)	1.95	0.76	2.24	0.65	−2.66	.005
Oceanian						
Australia	1.38	0.92	1.82	0.77	−3.69	.000
New Zealand	1.57	0.76	1.86	0.53	−2.64	.005
South American						
Brazil	1.70	0.90	2.21	0.82	−7.25	.000
Colombia	2.36	0.80	2.24	0.90	0.80	ns
Venezuela	2.18	0.89	2.42	0.75	−2.03	.022

Note: Potential mean values can range from 0 (unimportant) to 3 (indispensable).

samples (78%), the sex difference was statistically significant beyond the .05 level. Three samples – Colombian, Spanish, and South African Zulu – show the opposite sex difference, significant only in the Zulu sample. According to the research collaborator who collected the Zulu data, it is considered women's work to build the house, fetch water, and perform other arduous physical tasks, whereas men often travel from their rural homes to urban centers for work. This local division of labor might account for the sex difference reversal among the Zulu. In sum, moder-

Table 4. *Age difference preferred between self and spouse*

Sample	Males Mean	Males SD	Females Mean	Females SD	*t*-test	Sig.	Actual age diff.
African							
Nigeria	−6.45	5.04	4.90	2.17	21.99	.000	—
S. Africa (whites)	−2.30	2.19	3.50	2.23	13.38	.000	3.13
S. Africa (Zulu)	−3.33	2.31	3.76	3.68	10.80	.000	2.38
Zambia	−7.38	6.39	4.14	1.99	12.22	.000	—
Asian							
China	−2.05	2.47	3.45	1.73	29.06	.000	—
India	−3.06	2.55	3.29	1.96	19.07	.000	—
Indonesia	−2.72	4.41	4.69	1.87	13.29	.000	—
Iran	−4.02	1.62	5.10	1.79	17.98	.000	—
Israel (Jewish)	−2.88	3.82	3.95	4.90	14.13	.000	3.57
Israel (Palestinian)	−3.75	1.99	3.71	1.86	6.66	.000	3.57
Japan	−2.37	2.29	3.05	1.62	20.98	.000	2.92
Taiwan	−3.13	2.29	3.78	1.98	36.76	.000	3.50
European–Eastern							
Bulgaria	−3.13	2.87	4.18	2.61	21.35	.000	3.54
Estonian S.S.R.	−2.19	2.58	2.85	1.52	22.69	.000	2.49
Poland	−2.85	2.94	3.38	3.02	14.66	.000	2.10
Yugoslavia	−2.47	2.29	3.61	1.98	16.29	.000	3.55
European–Western							
Belgium	−2.53	5.15	2.46	2.49	5.49	.000	2.37
France	−1.94	2.47	4.00	3.17	12.97	.000	2.28
Finland	−0.38	3.22	2.83	2.35	5.57	.000	2.30
Germany–West	−2.52	3.87	3.70	3.67	20.18	.000	3.19
Great Britain	−1.92	3.78	2.26	2.58	6.02	.000	2.61
Greece	−3.36	3.20	4.54	2.55	14.98	.000	4.92
Ireland	−2.07	1.93	2.78	1.91	12.79	.000	2.17
Italy	−2.76	2.77	3.24	2.41	10.85	.000	3.68
Netherlands	−1.01	2.51	2.72	3.01	9.82	.000	2.58
Norway	−1.91	4.14	3.12	2.36	7.80	.000	2.87
Spain	−1.46	2.43	2.60	4.25	5.92	.000	2.45
Sweden	−2.34	4.87	2.91	2.79	8.08	.000	2.97
North American							
Canada (English)	−1.53	1.93	2.72	2.01	10.15	.000	2.51
Canada (French)	−1.22	1.69	1.82	1.83	7.43	.000	2.51
USA (Mainland)	−1.65	2.62	2.54	1.90	31.76	.000	2.71
USA (Hawaii)	−1.92	2.46	3.30	3.25	11.57	.000	—
Oceanian							
Australia	−1.77	2.34	2.86	2.72	12.16	.000	2.73
New Zealand	−1.59	2.47	2.91	1.85	11.66	.000	2.78
South American							
Brazil	−2.94	3.35	3.94	3.23	22.06	.000	3.52
Colombia	−4.45	3.01	4.51	2.85	16.88	.000	4.53
Venezuela	−2.99	3.05	3.62	3.25	13.63	.000	3.47
Mean	−2.66		3.42				2.99

Note: Negative values signify preference for a *younger* mate; positive values signify preference for an *older* mate.

ate support was found for the hypothesized sex difference in this cue to resource acquisition, although this difference cannot be considered universal.

3.2. Age differences

Table 4 shows the age differences preferred between self and mate. In each of the 37 samples, males prefer mates who are younger, which is consistent with the hypothesis that males value mates with higher reproductive capacity. These sex differences are the largest ones found in this study, showing statistical significance beyond the .0001 level in each of the 37 samples. Do the age preferences males express for females correspond more closely to peak reproductive value (mid-teens) or to peak fertility (early 20s)? By subtracting the mean age difference preferred between males and their mates (2.66 years) from the age at which males prefer to marry (27.49 years), it can be inferred that males in these samples prefer to marry females who are approximately 24.83 years old. This age preference is closer to peak female fertility than to peak reproductive value.

Not specifically predicted, but also consistent across all countries, females prefer mates who are older than they are. Indeed, females appear to prefer a larger age difference (3.42 years older) than do males (2.66 years younger). Adding the mean age difference preferred by females to the age at which females prefer to marry (25.39 years) yields a preferred mate age of 28.81 years.

The samples vary strikingly in age difference preferences. Nigeria and Zambia are the two countries in which males prefer the largest age difference between self and mate, 6.45 and 7.38 years younger, respectively. These are the only two countries in this study that practice substantial polygyny. In polygynous mating systems, males are typically older when they acquire wives than is the case in monogamous mating systems (Hart & Pilling 1960; Murdock 1967).

3.3. Actual age difference at marriage – a validity check

Two crucial questions can be posed about the validity of the methods and the reality of the preferences indicated by this study: Are self-reported preferences accurate indices of actual preferences? Are mate preferences reflected in actual mating decisions? To begin to address these questions, data were obtained from the most recent *Demographic Yearbook* (United Nations 1988) and the *Demographic Fact Book* (Republic of China 1987) on actual age at marriage. Demographic statistics were obtained for 27 of the 33 countries sampled in this study.

Actual age at marriage is not the same variable as preferred age at marriage or preferred mate age. Actual age at marriage is undoubtedly determined by many factors, including personal preferences, parental preferences, preferences exerted by members of the opposite sex, sex ratio, local availability of mates, and perhaps current resource holdings. Nonetheless, personal preferences, if they are to bear the conceptual importance ascribed to them in this study, should be reflected to some degree in actual mating decisions.

Actual age at marriage was estimated from the data presented for each country in the *Demographic Yearbook* and the *Demographic Fact Book*. Data in the *Yearbook* are broken down by age of bride and age of groom within each of a series of 5-year age brackets (e.g., 15–19; 20–24; 25–29). An estimated mean age of marriage was obtained by taking the mid-point of each of these age ranges and weighting this by the actual number of brides or grooms falling within the range. This must be regarded as an estimate or approximation of actual marriage age.

Several validity checks can be conducted by comparing these data with the preferred age at marriage, the age difference desired between self and mate, and the preferred mate age derived from these variables. Perhaps most central to this article are the comparisons between the age difference desired between self and mate and the actual age difference between marriage partners. These data are shown in Table 4 along with data on preferred age differences.

Across the 27 countries, the actual age differences between men and women at marriage range from 2.17 years (Ireland) to 4.92 years (Greece), all showing the wives to be younger on average than their husbands. The unit-weighted average age difference between husbands and wives across countries is 2.99 years. The present study found that males prefer their marriage partners to be 2.66 years younger on average, whereas females prefer mates to be 3.42 years older. Averaging across the sexes yields a mean preferred age difference of 3.04 years, which corresponds closely to the actual age difference of 2.99 years between spouses. Thus, preferred age differences between spouses are indeed reflected in actual age differences at marriage.

A second validity check can be made by comparing the absolute values of actual age at marriage with (a) preferred age at marriage and (b) preferred mate age. Males in this study indicate an average preferred marriage age of 27.5 years, with a preferred spouse age of 24.8 years. Females express a preference to marry at 25.4, and a spouse preferred to be 28.8 years old. Both preferred age of marriage and preferred mate age correspond closely in absolute value to the actual mean ages of grooms (28.2) and brides (25.3).

A third and perhaps more subtle validity check may be made *across* countries by correlating the magnitude of the preferred age difference with the magnitude of the actual age difference. This cross-country correlation is +.68 ($p<.001$, $N=28$) for males and +.71 ($p<.001$, $N=28$) for females. Samples preferring larger age differences indeed reside in countries where actual marriages show larger age differences. Samples from countries preferring smaller age differences inhabit countries where actual marriages show smaller age differences.

Several conclusions may be drawn from these validity checks. First, they provide strong validation for the self-report method used to obtain age preferences, and by implication, circumstantial validation for the other self-report measures used in this study. Second, they yield evidence that stated preferences are reflected in actual mating decisions. Third, they provide further support for the evolution-based hypothesis that males both prefer *and* choose females displaying cues to high reproductive capacity.

Table 5. *Good looks*

Sample	Males Mean	Males SD	Females Mean	Females SD	*t*-test	Sig.
African						
Nigeria	2.24	0.67	1.82	0.72	3.65	.000
S. Africa (whites)	1.58	0.65	1.22	0.65	3.05	.002
S. Africa (Zulu)	1.17	0.80	0.88	0.68	1.94	.027
Zambia	2.23	0.85	1.65	0.84	3.72	.000
Asian						
China	2.06	0.62	1.59	0.68	8.17	.000
India	2.03	0.73	1.97	0.75	0.59	ns*
Indonesia	1.81	0.81	1.36	0.62	3.76	.000
Iran	2.07	0.73	1.69	0.68	1.97	.027
Israel (Jewish)	1.77	0.93	1.56	0.75	2.52	.006
Israel (Palestinian)	2.38	0.60	1.47	0.81	6.72	.000
Japan	1.50	0.75	1.09	0.74	4.36	.000
Taiwan	1.76	0.77	1.28	0.66	8.07	.000
European–Eastern						
Bulgaria	2.39	0.68	1.95	0.84	4.70	.000
Estonian S.S.R.	2.27	0.69	1.63	0.70	8.10	.000
Poland	1.93	0.83	1.77	0.76	1.57	ns*
Yugoslavia	2.20	0.66	1.74	0.72	3.86	.000
European–Western						
Belgium	1.78	0.84	1.28	0.79	3.58	.000
France	2.08	0.81	1.76	0.77	2.78	.003
Finland	1.56	0.81	0.99	0.73	4.79	.000
Germany–West	1.92	0.74	1.32	0.72	11.37	.000
Great Britain	1.96	0.60	1.36	0.72	4.76	.000
Greece	2.22	0.69	1.94	0.77	2.14	.018
Ireland	1.87	0.64	1.22	0.69	5.33	.000
Italy	2.00	0.70	1.64	0.83	2.36	.010
Netherlands	1.76	0.72	1.21	0.72	7.81	.000
Norway	1.87	0.83	1.32	0.83	3.85	.000
Spain	1.91	0.68	1.24	0.82	4.65	.000
Sweden	1.65	0.77	1.46	0.83	1.55	ns*
North American						
Canada (English)	1.96	0.50	1.64	0.71	2.55	.007
Canada (French)	1.68	0.64	1.41	0.65	2.00	.024
USA (Mainland)	2.11	0.69	1.67	0.69	12.19	.000
USA (Hawaii)	2.06	0.75	1.49	0.81	4.67	.000
Oceanian						
Australia	1.65	0.74	1.24	0.73	4.20	.000
New Zealand	1.99	0.69	1.29	0.73	5.98	.000
South American						
Brazil	1.89	0.75	1.68	0.86	3.25	.001
Colombia	1.56	0.79	1.22	0.75	2.63	.005
Venezuela	1.76	0.90	1.27	0.98	3.64	.000

Note: * indicates significant in predicted direction on the ranking procedure for variable "physically attractive."

Table 6. *Chastity: No Previous experience in sexual intercourse*

Sample	Males Mean	Males SD	Females Mean	Females SD	*t*-test	Sig.
African						
Nigeria	1.22	1.10	0.51	0.72	4.97	.000
S. Africa (whites)	1.06	1.05	0.84	1.12	1.13	ns
S. Africa (Zulu)	1.17	1.06	0.31	0.62	4.82	.000
Zambia	1.66	1.03	0.98	1.03	3.29	.001
Asian						
China	2.54	0.82	2.61	0.77	−1.03	ns
India	2.44	0.98	2.17	1.11	1.95	.027
Indonesia	2.06	1.10	1.98	1.18	0.39	ns
Iran	2.67	0.88	2.23	0.99	1.70	.049
Israel (Jewish)	0.93	1.12	0.58	0.97	3.46	.001
Israel (Palestinian)	2.24	1.10	0.96	1.18	5.81	.000
Japan	1.42	1.09	0.78	0.86	5.17	.000
Taiwan	2.32	0.85	2.20	0.91	1.71	.040
European–Eastern						
Bulgaria	0.69	0.90	0.44	0.86	2.31	.011
Estonian S.S.R.	1.25	1.04	0.84	0.98	3.51	.001
Poland	1.23	1.03	0.99	1.03	1.80	.031
Yugoslavia	0.47	0.81	0.08	0.36	3.60	.001
European–Western						
Belgium	0.67	1.02	0.38	0.72	1.89	.031
France	0.45	0.88	0.41	0.81	0.30	ns
Finland	0.27	0.59	0.29	0.67	−0.17	ns
Germany–West	0.34	0.73	0.17	0.52	3.61	.000
Great Britain	0.46	0.75	0.49	0.93	−0.20	ns
Greece	0.48	0.85	0.40	0.88	0.51	ns
Ireland	1.49	1.03	1.47	1.08	0.11	ns
Italy	0.65	0.92	0.27	0.53	2.47	.008
Netherlands	0.29	0.69	0.29	0.69	−0.01	ns
Norway	0.31	0.72	0.30	0.74	0.08	ns
Spain	0.66	0.96	0.36	0.73	1.92	.029
Sweden	0.25	0.53	0.28	0.67	−0.32	ns
North American						
Canada (English)	0.55	0.76	0.33	0.80	1.41	ns
Canada (French)	0.62	0.95	0.33	0.68	1.58	ns
USA (Mainland)	0.85	0.96	0.52	0.85	6.88	.000
USA (Hawaii)	0.91	0.94	0.58	0.87	2.33	.011
Oceanian						
Australia	0.73	0.93	0.45	0.86	2.40	.009
New Zealand	0.88	1.07	0.72	1.04	0.91	ns
South American						
Brazil	0.93	1.08	0.36	0.78	7.32	.000
Colombia	1.27	1.06	0.30	0.61	6.33	.000
Venezuela	0.93	1.07	0.59	0.97	2.35	.010

3.4. Physical attractiveness

Table 5 shows the results for the rated variable "good looks." All 37 samples show sex differences in the predicted direction, with 34 significant beyond the .05 level. For those three countries (India, Poland, and Sweden) in which the difference was not significant for "good looks," the sex difference was significant in the predicted direction for the ranked variable "physically attractive." Thus, the hypothesis that males value physical attractiveness in potential mates more than females do is strongly supported by these cross-cultural data.

3.5. Chastity: No previous sexual intercourse

Table 6 shows the results for the variable of "chastity: no previous experience in sexual intercourse." Cultures in this study vary tremendously in the value placed on this mate characteristic. The samples from China, India, Indonesia, Iran, Taiwan, and Israel (Palestinian Arabs

only) attach high value to chastity in a potential mate. At the opposite extreme, samples from Sweden, Norway, Finland, the Netherlands, West Germany, and France indicate that prior sexual experience is irrelevant or unimportant in a potential mate. A few subjects even indicated in writing that chastity was *undesirable* in a potential mate. The Irish sample departs from the other Western European samples in placing moderate emphasis on chastity. Also showing moderate valuation of chastity are samples from Africa, Japan, Poland, and the Soviet republic of Estonia. It is noteworthy that chastity shows greater cross-cultural variability than any other rated variable in this study.

In contrast to the strong cross-cultural consistency of sex differences found with the previous four variables, only 23 (62%) of the samples show significant sex differences in the predicted direction. The remaining 14 samples (38%) show no significant sex differences in valuation of chastity. These results provide only moderate support for the evolution-based paternity probability hypothesis. They also yield equally powerful evidence of proximate cultural influences on the degree of importance placed on lack of prior sexual intercourse in a potential mate.

4. Conclusions

Each of the five evolution-based predictions received some empirical support from these data. Females value the financial capacity of potential mates more than males do. Ambition and industriousness, cues to resource acquisition, also tend to be valued more heavily by females than by males across cultures. Support was strong for the financial capacity prediction (36 of 37 samples), and moderate for the ambition–industriousness prediction (29 of 37 samples).

Although these results give powerful support to the evolution-based hypothesis about female preference for males with high providing capacity, the precise functions of this preference remain obscure. By way of comparison, the male arctic tern's ability to bring food to the female during courtship is a good predictor of his ability to feed chicks (Nisbet 1973). Does earning potential provide a similar cue in humans? Or does it provide a cue to increased status, protection, and perhaps even "good genes" (Trivers 1972) that pass to the female's offspring? Future research is needed to identify these functions and to examine characteristics that signal not just the capacity to acquire resources, but the male's *willingness* to devote those resources to a female and her offspring.

Males value physical attractiveness and relative youth in potential mates more than do females – sex differences that show remarkable generality across cultures. Our demographic data corroborate the preference data, showing that females are younger than males at actual age of marriage. The greater male preference for relative youth and physical attractiveness supports the evolution-based hypothesis about male preference for females showing cues to high reproductive capacity. These findings are especially noteworthy in that they reverse a general trend in these data suggesting that females in a majority of cultures tend to be more exacting in mate preferences across many characteristics. Although cultural variations exist with respect to standards of beauty, these variations apparently do not override sex differences in the importance attached to physical attractiveness.

The male age preference for females of just under 25 years implies that *fertility* has been a stronger ultimate cause of mate preferences than reproductive value. The fact that this age preference appears to be several years beyond peak fertility, however, suggests that other variables such as similarity (Rushton et al. 1984), compatibility (Murstein 1986), and perhaps maturity might also affect these age preferences. Recent data suggest that fertility may peak later in females than previously thought, perhaps in the mid-twenties (Anderson 1986; Short 1976). If these recent estimates are confirmed, then male age preferences may turn out to be closely calibrated with female fertility.

Although these data seem to falsify Symons's (1979) hypothesis that males prefer females of high reproductive value rather than of high fertility, a cautionary note must be added. These findings are based on the inference that subtracting the preferred age difference between self and mate from the age at which one prefers to marry accurately represents the true age preferred in mates. It is possible that this inference is unwarranted, and that when males actually reach the age at which they decide to marry, they may prefer females who are younger. Nonetheless, the validity check on actual age at marriage corroborates the finding on preferred age differences between self and mates, as well as the finding that females tend to marry on average at approximately 25 years of age. Future research could profitably explore this issue in greater detail by examining mate age preferences and actual ages within both short-term and long-term mating relationships.

Not specifically predicted was the finding that *females prefer somewhat older mates* in all 37 cultures. This finding, in conjunction with the known positive correlation between age and income among males (Jencks 1979; Willerman 1979), provides additional circumstantial evidence for the hypothesis that females prefer mates who show characteristics associated with having a high providing capacity. Older male age also could provide a cue to longevity, maturity, prowess, confidence, judgment, or experience (cf. Ellis, in press; Symons 1979). Further research is needed to uncover the functions of this cross-culturally robust female preference for older males.

The fifth evolution-based prediction, that males would value *chastity* in potential mates more than would females, was supported in 23 out of the 37 samples. In the remaining 14 samples, no significant sex differences emerged. Samples from Africa, the Middle East, South America, and Eastern Europe generally show the predicted sex differences in preferences for chastity in a potential mate. Many of the samples indicating no sex differences were concentrated in Western Europe, Canada, New Zealand, China, and Indonesia. These results provide modest support for the evolutionary hypothesis based on paternity probability. The wide variation in preference for chastity suggests that cultural differences, ecological differences, or mating system differences exert powerful effects on the value attached to chastity.

A speculation is warranted regarding the cross-cultural variability of sex differences in chastity valuation, when contrasted with the more pervasive sex differences found

in mate preferences for earning power, relative age, and physical attractiveness. Chastity differs from these other variables in that it is less directly observable. Even physical tests of female virginity are unreliable due to variations in the morphology of the hymen, rupture due to nonsexual causes, and deliberate alteration (Dickemann 1981). Sexual selection should favor preference mechanisms for cues that are reliably associated with characteristics that have fitness advantage for the mate selector. Where cues are not directly observable or cannot be reliably assessed, as in the case of chastity, it is difficult to imagine how *specific* preference mechanisms could have been fashioned by sexual selection. These considerations, of course, do not preclude selection for a more *general* mechanism such as sexual jealousy (Daly et al. 1982) that promotes a heightened concern about females having sexual contact with other males, either prior to or after mate choice. These speculations highlight our profound lack of knowledge about basic psychological mechanisms involved in human mating decisions (Symons 1987b).

In sum, three of the five predictions – those involving mate preferences for earning potential, relative youth, and physical attractiveness – were strongly confirmed across cultures. The prediction regarding ambition–industriousness was confirmed only in 29 samples, and showed a significant reversal among the Zulu. The chastity prediction received still less empirical support, with only 23 of the 37 samples showing significant sex differences.

4.1. Qualifications and limitations

Several important qualifications must attend the interpretation of these findings. First, the samples cannot be viewed as representative of the populations of each country; rural and less-educated individuals are underrepresented, although the samples of such individuals in this study indicate no departure from the primary predicted sex differences. Second, male and female preference distributions overlap considerably, in spite of mean differences. Third, neither earning potential nor physical appearance emerged as the highest rated or ranked characteristic for either sex, even though these characteristics showed large sex differences. *Both* sexes ranked the characteristics "kind–understanding" and "intelligent" higher than earning power and attractiveness in all samples, suggesting that species-typical mate preferences may be more potent than sex-linked preferences.

Other limitations surround the instruments, data sources, and operationalizations of the key constructs. Self-report contains obvious limitations and should be supplemented by alternative data sources in future studies. The close correspondence between the demographic data showing actual age at marriage data and the expressed mate preference data, however, suggests that we need not be pessimistic about the capacity of individuals to report preferences that are reflected in their actual mating decisions. Another limitation is that the single items used here may underestimate the magnitudes of the present sex differences, as they tend to be less reliable than composite clusters of items (Nunally 1978). And the set of characteristics representing each construct could be expanded to assess other mate characteristics such as the willingness of a male to invest resources, the willingness of a female to devote reproductive capacity to a given male, and behavioral cues associated with both proclivities.

A potential limitation involves the particular cultures selected for study. These samples are biased toward urbanized, cash-economy cultures. Less urbanized, non-cash cultures obviously must be studied to circumvent this bias. The tremendous cultural variability with respect to chastity, however, belies the notion that these 37 samples might somehow be culturally homogeneous and gives greater credibility to the empirical sex differences that transcend this cultural diversity.

Arranged marriages in some cultures pose another potential problem. If parents and other kin arrange marriages, how could mate preferences evolve or be expressed? We lack knowledge about the prevalence of arranged marriages in our environment of evolutionary adaptedness. Nonetheless, two factors mitigate this potential problem. First, if parents do arrange the marriages of their children, there is no reason to assume that they would not express preferences reflecting the reproductive considerations on which the central hypotheses here have been based. Research on parents' preferences for the mates of their sons and daughters is needed to confirm or falsify this speculation. Second, even in societies with arranged marriages, sons and daughters do exert choice. Offspring influence their parents' choices, carry on clandestine affairs, defy their parents' wishes, make threats of various sorts, and sometimes simply elope with a preferred mate (O'Kelly & Carney 1986). Personal preferences appear to be expressed even under socially constrained conditions.

Finally, these results yield little information about the proximate (social, psychological, physiological, ontogenetic) mechanisms directly responsible for their existence. Possible candidates include genetic differences between the sexes, sensory preferences analogous to food preferences, socialization differences during development, and structural effects at a societal level such as those that limit female access to economic resources (Buss & Barnes 1986). Although the evolutionary hypotheses presented here are largely supported by the results, research on proximate mechanisms is needed to develop a more complete explanatory account of observed sex differences in mate preferences.

4.2. Implications

This is the first study to examine human mate preferences across cultures on a broad scale (cf. Kurian 1979). It exceeds prior studies in geographic, cultural, political, economic, ethnic, religious, and racial diversity. However, many questions remain unanswered. Currently unknown are the cultural and ecological causes of variation from country to country in (1) the magnitudes of obtained sex differences, and (2) the absolute levels of valuing reproductively relevant mate characteristics. The internationally consistent sex differences in mate preferences found here, however, yield insight into human reproductive history, provide hypotheses about current sexual selection, and are among the most robust psychological sex differences of any kind ever documented across cultures (cf. Maccoby & Jacklin 1974; Willerman 1979).

What do these results reveal about human reproductive history? They support the hypothesis that males and females have faced different constraints on reproductive success in our evolutionary past. Females appear to have been limited in reproductive success by access to resources for self and offspring. Males appear to have been limited by access to fertile females. These different selection pressures have presumably produced different male and female reproductive strategies. The greater female preference for mates displaying cues to high resource potential and the greater male preference for mates displaying cues to high reproductive capacity appear to represent adaptations to sex-differentiated reproductive constraints in our evolutionary past.

What do these results reveal about current sexual selection? No definitive answer can be provided, as we lack data on reproductive differences associated with the expression of mate preferences. The findings, however, have strong implications for human intrasexual competition – a key component of Darwin's theory of sexual selection. Mate preferences should influence intrasexual competition such that males compete with each other to display the resources that females desire in mates; females should compete with each other to display the reproductively linked cues that males desire in mates (Buss 1988a). Furthermore, mate preferences should affect opposite sex intrasexual maneuvers, such as tactics used to guard or retain mates (Buss 1988b; Flinn 1988), tactics used for mate poaching, and perhaps tactics used to derogate intrasexual competitors (Buss & Dedden, submitted). These now established sex differences in mate preferences across 37 cultures provide a foundation for testing hypotheses about human intrasexual competition on an international scale.

Most generally, these results suggest that selective preferences in mating are not the sole province of females (Anderson 1986; Berenstain & Wade 1983; Robinson 1982; Smuts 1987), as is implied by some evolutionary accounts that stress female choosiness. Human males and females both express preferences, and it is clear that there are powerful selective advantages for doing so. These results also implicate cultural systems in determining sex differences or the absence of sex differences. The cross-cultural variability in chastity valuation serves as a strong reminder that even mechanisms closely linked with reproduction are not "genetically determined" in the sense of being inevitable or intractable. Finally, these results support the broad hypothesis that human males and females differ in reproductive strategies, and the specific hypothesis that mate preferences represent important components of these strategies.

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cultures that were not previously documented; (2) it confirms several important predictions from sexual selection theory; and (3) it illustrates the heuristic value of evolutionary theory in the study of human behavior.

The target article also adds to a small but steadily growing field of evolutionary psychology (e.g., Cosmides & Tooby 1987; Shepard 1987; Staddon 1988; Symons 1989). Its central aim is discovering basic psychological mechanisms – forged by natural selection operating over thousands of generations – that exist because they successfully solved adaptive problems that humans had to confront to survive and reproduce. Selecting a mate is just one such problem, and the present results provide only a partial understanding of human mating mechanisms. The target article does document both species-typical and sex-typical solutions to this problem, however, and in so doing takes us one step closer to understanding the evolutionary psychology of human mating.

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References

Letters a and r appearing before authors' initials refer to target article and response respectively.

Alexander, R. D. (1974) The evolution of social behavior. *Annual Review of Ecology and Systematics* 5:325–83. [WI]

(1979) *Darwinism and human affairs.* University of Washington Press. [WI, RWS]

(1980) *Darwinism and human affairs.* Pitman. [CJB]

Alexander, R. D. & Noonan, K. M. (1979) Concealment of ovulation, parental care, and human social evolution. In: *Evolutionary biology and human social behavior: An anthropological perspective*, ed. N. A. Chagnon & E. G. Irons. Duxbury Press. [aDMB]

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

Anderson, J. L. & Crawford, C. B. (1988) Anorexia nervosa: Models of the disorder as an adaptation for reproductive suppression. Paper presented at meetings of the Canadian Psychological Association, Montreal, June. [CC]

Badcock, C. R. (forthcoming) Is the Oedipus Complex a Darwinian adaptation? *Journal of the American Academy of Psychoanalysis.* [DR=L]

Bancroft, J., Sanders, D., Davidson, D. & Warner, P. (1983) Mood, sexuality, hormones, and the menstrual cycle. III. Sexuality and the role of androgens. *Psychosomatic Medicine* 45:509–16. [HN]

Barron, F. (1963) *Creativity and psychological health.* Van Nostrand. [aDMB]

Bateman, A. J. (1948) Intrasexual selection in *Drosophila. Heredity* 2:349–68. [aDMB]

Bateson, P. (1983) *Mate choice.* Cambridge University Press. [aDMB, MD]

Baucom, D. H., Besch, P. K. & Callahan, S. (1985) Relation between testosterone concentration, sex role identity, and personality among females. *Journal of Personality and Social Psychology* 48(5):1218–26. [HN]

Berenstain, L. & Wade, T. (1983) Intrasexual selection and male mating strategies in baboons and macaques. *International Journal of Primatology* 4:201–35. [aDMB, RHB]

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

Berscheid, E. & Walster, E. (1974) Physical attractiveness. In: *Advances in experimental social psychology*, ed. L. Berkowitz. Academic Press. [rDMB]

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

Blumberg, R. L. & Winch, R. F. (1972) Societal complexity and familial complexity: Evidence for the curvilinear hypothesis. *American Journal of Sociology* 77:898–920. [NDG]

Borgerhoff Mulder, M. (1988) Kipsigis bridewealth payments. In: *Human reproductive behavior: A Darwinian perspective*, ed. L. L. Betzig, M. Borgerhoff Mulder & P. W. Turke. Cambridge University Press. [aDMB, MD]

Bradbury, J. W. & Anderson, M. (1987) *Sexual selection: Testing the alternatives.* Wiley. [NN]

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

Burgess, E. W. & Wallin, P. (1953) *Engagement and marriage.* Lippincott. [AZ]

Burian, R. M. (1983) Adaptation. In: *Dimensions of Darwinism*, ed. M. Grene. Cambridge University Press. [DS]

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

Buss, D. M. (1984) Evolutionary biology and personality psychology: Toward a conception of human nature and individual differences. *American Psychologist* 39:1135–47. [DCR]

(1985) Human mate selection. *American Scientist* 73:47–51. [aDMB, JPR]

(1987) Sex differences in human mate selection criteria: An evolutionary perspective. In: *Sociobiology and psychology: Ideas, issues, and applications*, ed. C. Crawford, M. Smith & D. Krebs. Erlbaum. [aDMB]

(1988a) The evolution of human intrasexual competition: Tactics of mate attraction. *Journal of Personality and Social Psychology* 54:616–28. [arDMB, NWT]

(1988b) From vigilance to violence: Tactics of mate retention in American undergraduates. *Ethology and Sociobiology* 9:291–317. [arDMB]

(in press) Preference mechanisms in human mating. In: *Evolved mechanisms*, ed. J. Barkow, L. Cosmides & J. Tooby. Cambridge University Press. [rDMB]

(in preparation) Short- and long-term mating: Tactics. [rDMB]

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

Buss, D. M. & Dedden, L. (submitted) Derogation of competitors. [aDMB]

Buss, D. M., et al. (in press) International preferences in selecting mates: A study of 37 cultures. *Journal of Cross-cultural Psychology.* [rDMB]

Calder, C. (1967) Breeding behavior of the roadrunner *Geococcyx californianus. Aux* 84:597–98. [aDMB]

Caporael, L. R., Dawes, R. M., Orbell, J. M. & van de Kragt, A. J. C. (submitted) Selfishness examined: Cooperation in the absence of egoistic incentives. [LRC]

Chagnon, N. A. (1983) *Yanomamo: The fierce people* (3rd ed.). Holt, Rinehart and Winston. [DS]

Cohen, J. & Cohen, P. (1975) *Applied multiple regression/correlation analysis for the behavioral sciences.* Erlbaum. [rDMB]

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. [rDMB, CC, DS, JT]

Crawford, C. B. & Anderson, J. L. (1988) Testing evolutionary hypotheses about pathological behaviors. Paper presented at meetings of the Canadian Psychological Association, Montreal, June. [CC]

Cunningham, M. R. (1986) Measuring the physical in physical attractiveness: Quasi-experiments on the sociobiology of female beauty. *Journal of Personality and Social Psychology* 50:925–35. [rDMB]

(1988) Sociobiological dynamics in facial attractiveness. Paper presented at the 96th Annual Convention of the American Psychological Association, Atlanta. [RHB]

Daly, M. & Wilson, M. (1983) *Sex, evolution, and behavior.* Willard Grant Press. [aDMB, CJB, MD, DTK, RWS]

(1988) *Homicide.* Aldine de Gruyter. [aDMB]

Daly, M., Wilson, M. & Weghorst, S. J. (1982) Male sexual jealousy. *Ethology and Sociobiology* 3:11–27. [aDMB]

Darwin, C. (1859) *On the origin of the species by means of natural selection, or preservation of favoured races in the struggle for life.* London: Murray. [aDMB, MTG]

(1859a) *The origin of species by means of natural selection.* Penguin Books. [RHB]

(1871) *The descent of man and selection in relation to sex.* London: Murray. [aDMB]

(1877) *The descent of man and selection in relation to sex*, second edition, revised and augmented. Murray. [JLL]

Darwin, E. (1794) *Zoonomia; or, the laws of organic life*, vol. 1. J. Johnson. [MTG]

de Waal, F. (1982) *Chimpanzee politics.* Harper & Row. [HRB]

Dickemann, M. (1979a) Female infanticide, reproductive strategies and social

stratification: A preliminary model. In: *Evolutionary biology and human social behavior: An anthropological perspective*, ed. N. A. Chagnon & W. D. Irons. Duxbury Press. [MD]

(1979b) The ecology of mating systems in hypergynous dowry societies. *Social Science Information* 18:163–75. [MD]

(1981) Paternal confidence and dowry competition: A biocultural analysis of purdah. In: *Natural selection and social behavior*, ed. R. D. Alexander & D. W. Tinkle. Chiron Press. [aDMB, MD]

(1985) Human sociobiology: The first decade. *New Scientist* 107:38–42. [CJB]

Dunbar, R. I. M. (1982) Intraspecific variations in mating strategy. In: *Perspectives in ethology*, vol. 5, ed. P. P. G. Bateson & P. H. Klopfer. Plenum. [NN]

Eberhard, W. G. (1985) *Sexual selection and animal genitalia*. Harvard University Press. [MTG]

Eibl Eibesfeldt, I. (1970) *Ethology: The biology of behavior*. Holt, Rinehart and Winston. [NN]

Elder, G. H., Jr. (1969) Appearance and education in marriage mobility. *American Sociological Review* 34:519–33. [rDMB]

Ellis, B. J. (in press) The evolution of sexual attraction: Evaluative mechanisms in women. In: *Evolved mechanisms in human behavior and culture*, ed. J. H. Barkow, L. Cosmides & J. Tooby. Oxford University Press. [aDMB]

Duby, G. (1978) *Medieval marriage: Two models from 12th-century France*, trans. E. Forster. Johns Hopkins University Press. [MD]

Emlen, S. T. & Oring, L. W. (1977) Ecology, sexual selection, and the evolution of mating systems. *Science* 197:215–30. [aDMB]

Epstein, E. & Guttman, R. (1984) Mate selection in man: Evidence, theory and outcome. *Social Biology* 31:3–4. [AZ]

Fisher, R. A. (1930) *The genetical theory of natural selection*. Clarendon Press. [aDMB, CC, MTG]

Fisher, S. (1973) *The female orgasm: Psychology, physiology, fantasy*. Basic Books. [DR=L]

Flinn, M. (1981) Uterine vs. agnatic kinship variability and associated cousin marriage preferences: An evolutionary biological analysis. In: *Natural selection and social behavior: Recent research and new theory*, ed. R. D. Alexander & D. W. Tinkle. Chiron Press. [GB, WI]

(1988) Mate guarding in a Caribbean village. *Ethology and Sociobiology* 9:1–28. [aDMB, MD]

Flinn, M. V. & Low, B. (1986) Resource distribution, social competition, and mating patterns in human societies. In: *Ecological aspects of evolution: Birds and mammals*, ed. D. I. Rubinstein & R. W. Wrangham. Princeton University Press. [MD]

Foley, R. (1987) *Another unique species: Patterns in human evolutionary ecology*. John Wiley. [LRC]

Ford, C. S. & Beach, F. A. (1951) *Patterns of sexual behavior*. Harper & Row. [aDMB, JLL]

Freedman, D. G. (1979) *Human sociobiology*. Free Press. [RHB]

Gardner, E., Gray, D. J. & O'Rahilly, R. O. (1975) *Anatomy*. W. B. Saunders. [JLL]

Gaulin, S. J. C. & Schlegel, A. (1980) Paternal confidence and paternal investment: A cross-cultural test of a sociobiological hypothesis. *Ethology and Sociobiology* 1:301–9 [WI]

Ghiselin, M. T. (1969) *The triumph of the Darwinian method*. University of California Press. [MTG]

(1974) *The economy of nature and the evolution of sex*. University of California Press. [MTG]

Glass, G. V. & Stanley, J. C. (1970) *Statistical methods in education and psychology*. Prentice-Hall. [JH]

Goodall, J. (1986) *The chimpanzees of the Gombe*. Belknap Press. [RHB]

Gough, H. G. (1973) Personality assessment in the study of population. In: *Psychological perspectives on population*, ed. J. T. Fawcett. Basic Books. [aDMB]

Gould, S. J. (1986) Evolution and the triumph of homology, or why history matters. *American Scientist* 74:60–69. [RHB]

Goody, J. (1983) *The development of the family and marriage in Europe*. Cambridge University Press. [MD]

Guttman, L. (1981) Efficacy coefficients for differences among averages. In: *Multidimensional data representations: When & why*, ed. I. Borg. Mathesis Press. [AZ]

(1988) Eta, Disco, O Disco and F. *Psychometrika* 53. [AZ]

Hamilton, W. D. (1964) The evolution of social behavior. *Journal of Theoretical Biology* 7:1–52. [RWS]

(1966) The moulding of senescence by natural selection. *Journal of Theoretical Biology* 12:12–45. [RWS]

(1971) Selection of selfish and altruistic behavior in some extreme models. In: *Man and beast: Comparative social behavior*, ed. J. F. Eisenberg & W. S. Dillon. Smithsonian Institution. [NN]

Harding, S. & O'Barr, J. F. (1987) *Sex and scientific inquiry*. University of Chicago Press. [LRC]

Harris, R. J. (1975) *A primer of multivariate statistics*. Academic Press. [rDMB]

Hart, C. W. & Pilling, A. R. (1960) *The Tiwi of North Australia*. Holt, Rinehart & Winston. [aDMB, MD]

Hays, W. L. (1981) *Statistics*, third edition. Holt, Rinehart & Winston. [rDMB]

Hill, R. (1945) Campus values in mate selection. *Journal of Home Economics* 37:554–58. [aDMB]

Hofstede, G. (1980) *Culture's consequences: International differences in work-related values*. Sage Publications. [WJL]

Hrdy, S. B. (1981) *The woman that never evolved*. Harvard University Press. [RHB]

Hudson, J. W. & Henze, L. F. (1969) Campus values in mate selection: A replication. *Journal of Marriage and the Family* 31:772–75. [aDMB]

Huntingford, F. A. & Turner, A. (1987) *Animal conflict*. Chapman and Hall. [CJB]

Imperato-McGinley, J., Guerrero, L., Gautier, T. & Peterson, R. E. (1974) Steroid 5-alpha-reductase deficiency in man: An inherited form of male pseudohermaphroditism. *Science* 186:1213–15. [HN]

Irons, W. (1983) Human female reproductive strategies. In: *Social behavior of female vertebrates*, ed. S. K. Wasser. Academic Press. [MD, WI]

Jencks, C. (1979) *Who gets ahead? The determinants of economic success in America*. Basic Books. [aDMB]

Jowell, R. & Witherspoon, S. (1987) *British social attitudes*. Gower. [CJB]

Katchadourian, H. (1977) *The biology of adolescence*. W. H. Freeman. [JLL]

Kenrick, D. T. (1987) Gender, genes, and the social environment: A biosocial interactionist perspective. In: *Review of personality and social psychology: Sex and gender*, vol. 7, ed. P. Shaver & C. Hendrick. Sage. [DTK]

Kenrick, D. T. & Keefe, R. C. (submitted) Gender differences in age criteria for a mate increase over the life span. [DTK]

Kenrick, D. T., Sadalla, E. K., Groth, G. & Trost, M. R. (in press) Gender and trait requirements in a mate: An evolutionary bridge between personality and social psychology. *Journal of Personality*. [DTK]

Kenrick, D. T. & Trost, M. R. (1988) A reproductive exchange model of heterosexual relationships: Putting proximate economics in ultimate perspective. In: *Review of personality and social psychology*, vol. 10, ed. C. Hendrick. Sage. [DTK, NWT]

Kimura, D. (1987) Are man's and woman's brains really different? *Canadian Psychology* 28:133–47. [CC]

Kinsey, A. C., Pomeroy, W. B. & Martin, C. E. (1948) *Sexual behavior in the human male*. Saunders. [DTK]

Kirk, R. (1968) *Experimental design: Procedures for the behavior sciences*. Brooks-Cole. [rDMB]

Kitcher, P. (1985) *Vaulting ambition: Sociobiology and the quest for human nature*. MIT Press. [LRC]

Kurian, G. (1979) *Cross-cultural perspectives of mate-selection and marriage*, ed. G. Kurian. Greenwood. [aDMB]

Lack, D. (1940) Pair formation in birds. *Condor* 42:269–86. [aDMB]

Lambert, H. H. (1987) Biology and equality: A perspective on sex differences. In: *Sex and scientific inquiry*, ed. S. Harding & J. F. O'Barr. University of Chicago Press. [LRC]

Lee, G. R. (1982) *Family structure and interaction: A comparative analysis*. University of Minnesota Press. [NDG]

Lenington, S. (1981) Child abuse: The limits of sociobiology. *Ethology and Sociobiology* 2:17–29. [CJB]

Lévi-Strauss, C. (1969) *The elementary structures of kinship*. Revised edition, trans. J. H. Bell, J. R. von Sturmer & R. Needham. Beacon Press. [MD]

Littlefield, C. H. & Rushton, J. P. (1986) When a child dies: The sociobiology of bereavement. *Journal of Personality and Social Psychology* 51:797–802. [JPR]

Low, B. S. (1979) Sexual selection and human ornamentation. In: *Evolutionary biology and human social behavior*, ed. N. A. Chagnon & W. Irons. Duxbury. [JLL]

Lumsden, C. J. & Wilson, E. O. (1981) *Genes, mind, and culture*. Harvard University Press. [RJHR]

(1982) Precis of *Genes, mind and culture*. *Behavioral and Brain Sciences* 5:1–37. [JPR]

Maccoby, E. & Jacklin, C. (1974) *The psychology of sex differences*. Stanford University Press. [aDMB, LRC, WI]

Majerus, M. (1986) The genetics and evolution of female choice. *Trends in Ecology and Evolution* 1:1–7. [aDMB]

Maynard Smith, J. (1977) Parental investment – a prospective analysis. *Animal Behavior* 25:1–9. [NN]

(1982) *Evolution and the theory of games.* Cambridge University Press. [NN]

Maynard Smith, J. & Price, G. R. (1973) The logic of animal conflict. *Nature* 246:15–18. [NN]

Mayr, E. (1976) Behavior programs and evolutionary strategies. In: *Evolution and the diversity of life: Selected essays,* ed. E. Mayr. Harvard University Press. [JT]

(1982) *The growth of biological thought.* Belknap Press. [RHB]

(1983) How to carry out the adaptationist program. *American Naturalist* 121:324–34. [RHB]

McDougall, W. (1908) *Social psychology.* Methuen. [DTK]

McGinnis, R. (1958) Campus values in mate selection. *Social Forces* 35:368–73. [aDMB]

Mead, M. (1949) *Male and female.* Morrow. [JT]

Meyer-Bahlberg, H. F. L. (1984) Psychoneuroendocrine research on sexual orientation: Current status and future options. In: *Sex differences in the brain: Progress in the brain research,* vol. 61, ed. G. J. de Vries, J. P. C. de Bruin, H. B. M. Uylings & M. A. Corner. Elsevier Biomedical. [HN]

Money, J. & Ehrhardt, A. A. (1972) *Man and woman, boy and girl.* Johns Hopkins University Press. [HN]

Murdock, G. P. (1949) *Social structure.* Macmillan. [MD]

(1967) *Ethnographic atlas.* Pittsburgh University Press. [aDMB, SME]

Murstein, B. I. (1986) *Paths to marriage.* Sage Publications. [aDMB]

Nisbet, I. C. T. (1973) Courtship feeding, egg-size and breeding success in common terns. *Nature* 241:141–42. [aDMB]

Nunally, J. (1978) *Psychometric theory.* McGraw-Hill. [aDMB, JH]

Nyborg, H. (1979) Sex chromosome abnormalities and cognitive performance. V: Female sex hormone and discontinuous cognitive development. Paper presented at the symposium on Cognitive Studies at the fifth biennial meeting of the International Society for the Study of Behavioural Development, Lund, Sweden. [HN]

(1983) Spatial ability in men and women: Review and new theory. In: *Advances in human research and therapy,* vol. 5 (whole number), Monography Series. Pergamon Press. [HN]

(1984) Performance and intelligence in hormonally-different groups. In: *Sex differences in the brain: Progress in the brain research,* vol. 61, ed. G. J. de Vries, J. P. C. de Bruin, H. B. M. Uylings & M. A. Corner. Elsevier Biomedical Press. [HN]

(1986) Sex chromosomes, sex hormones, and developmental disturbances: In search of a model. Paper presented at the 152nd annual national meeting of the American Association for the Advancement of Science, Philadelphia. [HN]

(1987) Covariant trait development across species, race, and within individuals: Differential K-theory, genes, and hormones? Paper presented at the 3rd meeting of the International Society for the Study of Individual Differences, Toronto, Canada. [HN]

(in preparation) Sex, body, mind, and society: A physicological approach. [HN]

O'Kelly, C. G. & Carney, L. S. (1986) *Women and men in society: Cross-cultural perspectives on gender stratification.* Wadsworth Publishing. [aDMB]

OPCS (1988) Mid 1985-based subnational population projection 1985–2005. London, Report of the Office of Population Censuses and Surveys, PP3 Series No. 7. [CJB]

Parker, S. T. (1987) A sexual selection model for hominid evolution. *Human Evolution* 2:235–53.

Partridge, L. & Halliday, T. (1984) Mating patterns and mate choice. In: *Behavioural ecology: An evolutionary approach,* 2nd ed., ed. J. R. Krebs & N. B. Davies. Sinauer. [NN]

Pfafflin, S. M. (1984) Women, science, and technology. *American Psychologist* 39:1183–86. [LRC]

Plomin, R., DeFries, J. C. & McClearn, G. E. (1980) *Behavioral genetics: A primer.* W. H. Freeman. [DCR]

Pomiankowski, A. (1987) Sexual selection: The handicap principle does work – sometimes. *Proceedings of the Royal Society of London Series B* 231:123–45. [NN]

Price, T., Kirkpatrick, M. & Arnold, S. J. (1988) Directional selection and the evolution of breeding date in birds. *Science* 240:798–99. [DRC]

Purifoy, F. E. & Koopmans, L. H. (1981) Androstenedione, testosterone, and free testosterone concentration in women of various occupations. *Social Biology* 26(3):179–88. [HN]

Rancour-Laferrier, D. (1985) *Signs of the flesh: An essay on the evolution of hominid sexuality.* Berlin: Mouton de Gruyter. [DR-L]

Republic of China (1987) *1986 Taiwan-Fukien demographic fact book: Republic of China.* Ministry of the Interior, Taipei, Taiwan. [aDMB]

Rice, W. R. (1988) Heritable variation in fitness as a prerequisite for adaptive female choice: The effect of mutation-selection balance. *Evolution* 42:817–20.

Richardson, H. (1939) Studies of mental resemblance between husbands and wives and between friends. *Psychological Bulletin* 36:104–42. [RJHR]

Robinson, J. (1982) Intrasexual competition and mate choice in primates. *American Journal of Primatology* Suppl. 1:131–44. [aDMB]

Rohde, V., Stahl, F., Goertz, F. & Dörner, G. (1978) Neuroendocrine findings in subjects with sexual deviations. In: *Hormones and brain development: Developments in endocrinology,* vol. 3, ed. G. Dörner & M. Kawakami. Elsevier/North-Holland Biomedical Press. [HN]

Romanes, G. J. (1893–97) *Darwin and after Darwin,* 2nd ed., 3 vols. Longmans. [MTG]

Rowe, D. C., Clapp, M. & Wallis, J. (1987) Physical attractiveness and the similarity of identical twins. *Behavior Genetics* 17:191–201. [DRC]

Rowe, D. C. & Osgood, D. W. (1984) Heredity and sociological theories of delinquency: A reconsideration. *American Sociological Review* 49:526–40. [JPR]

Rushton, J. P. (1988) Genetic similarity, mate choice, and fecundity in humans. *Ethology and Sociobiology* 9:329–35. [JPR]

Rushton, J. P. & Bogaert, A. (1987) Race differences in sexual behavior: Testing an evolutionary hypothesis. *Journal of Research in Personality* 21:529–51. [HN]

Rushton, J. P. & Chan, P. K. F. (in press) Genetic similarity in male friendships. *Ethology and Sociobiology.* [JPR]

Rushton, J. P. & Nicholson, I. R. (1988) Genetic similarity theory, intelligence, and human mate choice. *Ethology and Sociobiology* 9:45–57. [JPR]

Rushton, J. P. & Russell, R. J. H. (1985) Genetic similarity theory: A reply to Mealey and new evidence. *Behaviour Genetics* 15:575–82. [JPR]

Rushton, J. P., Russell, R. J. H. & Wells, P. A. (1984) Genetic similarity theory: Beyond kin selection. *Behavior Genetics* 14:179–93. [aDMB, JPR]

Russell, R. J. H., Wells, P. A. & Rushton, J. P. (1985) Evidence for genetic similarity detection in human marriage. *Ethology and Sociobiology* 6:183–87. [RJHR, JPR]

Sahlins, M. (1976) *The use and abuse of biology: An anthropological critique of sociobiology.* University of Michigan Press. [JT]

Scarr, S. & Grajeck, S. (1982) Similarities and differences among siblings. In: *Sibling relationships,* ed. M. E. Lamb & B. Sutton-Smith. Erlbaum. [JPR]

Schiavi, R. C., Theilgaard, A., Owen, D. R. & White, D. (1984) Sex chromosome anomalies, hormones, and aggressivity. *Archives of General Psychiatry* 41:93–99. [HN]

Segalen, M. (1986) *Historical anthropology of the family,* trans. J. C. Whitehouse & S. Matthews. Cambridge University Press. [MD]

Shepard, R. N. (1987) Evolution of a mesh between principles of the minds and regularities of the world. In: *The latest on the best: Essays on evolution and optimality,* ed. J. Dupre. MIT Press. [rDMB]

Sherwin, B. B. & Gelfand, M. M. (1987) The role of androgen in the maintenance of sexual functioning in oophorectomized women. *Psychosomatic Medicine* 49:397–409. [HN]

Sherwin, B. B., Gelfand, M. M. & Brender, W. (1985) Androgen enhances sexual motivation in females: A prospective, crossover study of sex steroid administration in the surgical menopause. *Psychosomatic Medicine* 47(4):339–51. [HN]

Shields, W. M. & Shields, L. M. (1983) Forcible rape: An evolutionary perspective. *Ethology and Sociobiology* 4:115–35. [CJB]

Short, R. (1976) The evolution of human reproduction. *Proceedings of the Royal Society of London* 195:3–24. [aDMB]

Simpson, G. G. (1964) *This view of life.* Harcourt Brace. [HRB]

Smith, R. L. (1984) Human sperm competition. In: *Sperm competition and the evolution of animal mating systems,* ed. R. L. Smith. Academic. [JLL]

Smuts, B. (1987) Sexual competition and mate choice. In: *Primate societies,* ed. B. Smuts et al. University of Chicago Press. [aDMB]

Soma, H., Takayama, M., Takashi, K., Akaeda, T. & Takoro, K. (1975) Serum gonadotropin levels in Japanese women. *Obstetrics and Gynecology* 46(3):311–12. [HN]

Sperber, D. (1984) Anthropology and psychology: Towards an epidemiology of representations. *Man* 20:73–89. [JT]

Spuhler, J. N. (1968) Assortative mating with respect to physical characteristics. *Eugenics Quarterly* 15:128–40. [RJHR]

Staddon, J. E. R. (1988) Learning as inference. In: *Evolution and learning,* ed. R. C. Bolles & M. D. Beecher. Erlbaum.

Stewart, A. J. & Winter, D. G. (1977) The nature and causes of female suppression. *Signs* 2:531–53. [rDMB]

Stone, L. (1977) The family, sex and marriage in England: 1500–1800. Harper & Row. [MD]

Symons, D. (1979) *The evolution of human sexuality.* Oxford University Press. [aDMB, DS]

(1980) Précis of *The evolution of human sexuality*. *Behavioral and Brain Sciences* 3:171–214. [JPR]
(1987a) Can Darwin's view of life shed light on human sexuality? In: *Approaches and paradigms in human sexuality*, ed. J. H. Geer & W. T. O'Donohue. Plenum. [aDMB]
(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. [arDMB, DS, JT]
(1989) A critique of Darwinian anthropology. *Ethology and Sociobiology* 9(5). [rDMB, JT, DS]
Taylor, P. A. & Glenn, N. D. (1976) The utility of education and attractiveness for females' status attainment through marriage. *American Sociological Review* 41:484–98. [rDMB]
Tellegen, A., Lykken, D. T., Bouchard, T. J., Jr., Wilcox, K., Segal, N. & Rich, S. (1988) Personality similarity in twins reared apart and together. *Journal of Personality and Social Psychology* 54:1031–39. [JPR]
Theilgaard, A. (1984) A psychological study of the personalities of XYY- and XXY-men. *Acta Psychiatrica Scandinavica* 69 (suppl. no. 315). [HN]
Thiessen, D. D. & Gregg, B. (1980) Human assortative mating and genetic equilibrium. *Ethology and Sociobiology* 1:111–40. [aDMB]
Thornhill, R. & Thornhill, N. W. (1983) Human rape: An evolutionary analysis. *Ethology and Sociobiology* 4:63–99. [aDMB, NWT]
Tomlinson, I. P. M. (1988) Diploid models of the handicap principle. *Heredity* 60:283–93.
Tooby, J. & Cosmides, L. (1989) Evolutionary psychology and the generation of culture, part I: Theoretical considerations. *Ethology and Sociobiology* 9(5). [DS, JT]
(submitted) On the universality of human nature and the uniqueness of the individual: The role of genetics and adaptation. [JT]
Townsend, J. M. (in press) Mate selection criteria: A pilot study. *Ethology and Sociobiology*. [rDMB]
Trivers, R. L. (1972) Parental investment and sexual selection. In: *Sexual selection and the descent of man*, ed. B. Campbell. Aldine. [aDMB, DTK, CJB, JLL, RWS]
(1985) *Social evolution*. Benjamin/Cummings. [aDMB, CC, RWS]
U. S. Department of Commerce (1987) *Statistical abstract of the United States: 1987*. U. S. Government Printing Office. [NDG]
Uddenberg, N. (1974) Psychological aspects of sexual inadequacy in women. *Journal of Psychosomatic research* 18:33–47. [DR-L]
Udry, J. R. & Eckland, B. K. (1984) Benefits of being attractive: Differential payoffs for men and women. *Psychological Reports* 54:47–56. [rDMB]
United Nations (1988) *1986 demographic yearbook*. United Nations. [aDMB]
Vandenberg, S. G. (1972) Assortative mating, or who marries whom? *Behavior Genetics* 2:127–57. [RJ HR]
van den Berghe, P. L. (1983) Human inbreeding avoidance: Culture in nature. *Behavioral and Brain Sciences* 6:91–123. [JPR]
Vining, D. R. (1984) Subfertility among the very intelligent: An examination of the American Mensa. *Personality and Individual Differences* 5(6):725–33. [HN]
Wallace, A. R. (1870) *Contributions to the theory of natural selection*. Macmillan. [MTG]
Weismann, A. (1891–92) *Essays upon heredity and kindred subjects*, 2nd ed., 2 vols. Clarendon Press. [MTG]
West-Eberhard, M. J. (1983) Sexual selection, social competition and speciation. *Quarterly Review of Biology* 58:155–83. [MTG]
(1987) Flexible strategy and social evolution. In: *Animal societies: Theories and facts*, ed. Itô, Y., Brown, J. L. & Kikkawa, J. Japan Science Society Press. [RWS]
Whalen, R. E. (1980) Evolution causation: How proximate is ultimate. *Behavioral and Brain Sciences* 3:202–3. *[BAG]*
Willerman, L. (1979) The psychology of individual and group differences. Freeman. [aDMB]
Williams, G. C. (1957) Pleiotropy, natural selection and the evolution of senescence. *Evolution* 11:398–411. [RWS]
(1975) *Sex and evolution*. Princeton University Press. [aDMB, JH]
Williams, J. E. & Best, D. L. (1982) *Measuring sex stereotypes: A thirty-nation study*. Sage Publications. [WJL]
Wilson, E. O. (1975) *Sociobiology: The new synthesis*. Harvard University Press. [CJB]
(1978) *On human nature*. Harvard University Press. [CJB]
Winer, B. J. (1971) *Statistical principles in experimental design* (2nd edition). McGraw-Hill. [rDMB]
Wittenburger, J. L. (1981) *Animal social behavior*. Duxbury Press. [CC]
Wrangham, R. W. (1988) *Bridging the gaps: Social relationships in animals and people*. Rackham Reports 1987–1988, University of Michigan. [RWS]
Whyte, M. K. (1978) *The status of women in preindustrial societies*. Princeton University Press. [MD]