Is Accuracy in Fertility Detection Mediated by

Differences in the Mate Value of the Rater and

Target?

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By

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The undersigned, appointed by the dean of the Graduate School, have examined the thesis entitled

IS ACCURACY IN FERTILITY DETECTION MEDIATED BY DIFFERENCES IN THE

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presented by Drew H. Bailey,

a candidate for the degree of master of arts,

and hereby certify that, in their opinion, it is worthy of acceptance.

Professor David C. Geary
Professor Mark Flinn
Professor Craig Palmer
Professor Phillip Wood

For my parents, whose unwavering support is the foundation upon which my achievements rest

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Abstract

I propose the existence of a perceptual bias in men toward detecting fertility status in women of similar mate value. To test this hypothesis, 153 male undergraduates (raters) chose which of two photographs of the same woman was more attractive for 116 female undergraduates (targets) photographed once at ovulation and once during a non-fertile phase of their menstrual cycle. Differences between independently determined rankings of women's physical attractivenesses and the men's self-perceived mate values were curvilinearly associated. Men's accuracy at detecting mate value differences peaked for women of modestly higher mate value than themselves, with lower accuracies for women of lower attractiveness and substantially higher attractiveness than themselves. Furthermore, these functions varied with manipulations of apparent target partner status and rater self-perceived mate value. Results suggest that men's sensitivity to cycle-related changes in women's attractiveness vary with the fit between the man's self-perceived mate value and the relative attractiveness of the woman. I discuss how this perceptual bias might have coevolved with a tendency to seek mates with similar mate values.

Is Accuracy in Fertility Detection Mediated by Differences in the Mate Value of the Rater and

Target?

Perceptual inaccuracies can at times provide adaptive advantages. Jackson's and

Cormack's (2007) demonstration that people reliably overestimate heights, especially when they

are looking down from above, is a clear example. In this potentially dangerous situation,

inaccuracy will result in more cautious behavior than will accuracy. Schiff and Oldak (1990)

demonstrated that individuals underestimate an object's time to arrival especially when the

object is moving directly toward them; people believe an object will arrive sooner than it actually

will arrive, enabling better defensive behaviors. Palmer and Thornhill (2003) proposed the

existence of a "knowledge destroyer" adaptation, which blinds oneself to logic when confronted

with a viewpoint inconsistent with one's own ideology and self-interest, thereby functioning to

keep one's beliefs in line with one's community's beliefs. Geary (2007) proposed that humans'

evolved attributional and inferential biases related to folk-psychology inhibit learning in the

social sciences, motivating them to reject "research results that 'undermine' their sense of

personal agency and control (pp. 72-73)".

Haselton and Buss (2000) hypothesized that men's over estimation of women's sexual

interest and women's under estimation of men's commitment to relationships, along with other

sex differences in mating-related cognitions, are evolved inaccuracies. Their term, "Error

Management Theory," describes a framework that enables the generation of predictions about

various adaptive behaviors related to mating. I elaborate on their model by examining the

adaptive limits of inaccuracy in a mating context. In order to better understand the rationale

leading to Haselton's and Buss' (2000) model, I first discuss the evolutionary origins of sex

differences in mating-related behaviors, and then turn to the potentially adaptive advantage of mating-related inaccuracies, and the theoretical adaptive limits of such inaccuracies.

SEXUAL SELECTION AND PARENTAL INVESTMENT

Sexual selection (Darwin, 1871) comprises intrasexual competition over mates and intersexual choice of mating partners; most commonly manifested as male-male competition and female choice. Specifically, intrasexual competition refers to the process through which same-sex individuals vie for access to mates or for control of resources mates need to reproduce (e.g., nesting sites). Intersexual choice refers to the process through which members of one sex decide which vying opposite-sex individual to accept as a mate. These processes can be closely linked such that choice might be based on the outcomes of intrasexual competition (e.g., Borgia & Coleman, 2000; Trivers, 1972).

For a species in which one sex practices direct intrasexual competition–for example, in the species of antelope, *Oryx leucoryx*, males battle by attempting to spear each other with their horns (Darwin, 1871)–the opposite sex will choose to mate with the victor, either through direct choice or because all other potential mates have been driven away. Therefore, in these species, intersexual choice is secondary to intrasexual competition. For a species in which one sex practices indirect intrasexual competition, such as the peacock (*Pavo cristatus*) where males compete and females chose based on the size and symmetry of the male's train (Petrie, Halliday, & Sanders, 1991), reproductive success for the competing sex is largely driven by intersexual choice, female choice in this case.

Trivers (1972) integrated the mechanisms of sexual selection with sex differences in parental investment, following Williams (1966). Trivers predicted that the sex that must provide the higher minimum investment in offspring will be more selective than the lower-investing sex

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when choosing a mate. Members of the lower investing sex, in turn, will compete intensely for the parental investment–via sexual access–of the higher investing sex. Trivers' predictions have been largely supported, regardless of whether females or males are the higher investing sex (Andersson, 1994; Clutton-Brock, 1991).

Clutton-Brock and Vincent (1991) proposed that sex differences in parental investment evolved as a result of a more fundamental difference in the maximum potential rate of reproduction. The sex with the faster potential rate has lower parental investment, because members of this sex can rejoin the mating pool more quickly and easily than can members of the slower reproducing sex. As an example, the pregnancy of female elephants lasts 21 months, and after this they must nurse their young for approximately 2 years (Lawrence, 1989). A male elephant, however, can potentially mate with many females over the span of almost 4 years. In other words, the option for males is to rejoin the mating pool after copulating with the female, or wait 45 months to invest in offspring. For the elephant and most other species, males that rejoin the mating pool to compete for additional mates will have a reproductive advantage over parental males.

As with elephants, internal gestation and postpartum suckling necessarily result in a slower potential rate of reproduction for all female than male mammals. Therefore, Trivers' (1972) and Clutton-Brock's and Vincent's (1991) theories predict that among mammalian species, males will compete for access to mates more than females, and females will be the more choosy sex. These predicted sex differences have been confirmed for more than 95% of mammalian species; in these species females provide all parental care and males compete intensely for sexual access to females (Clutton-Brock, 1991). For most of the remaining species,

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including humans, both sexes invest in offspring although females are typically the more choosy sex and males the more sexually competitive sex (Geary, 2005).

<div align="center">SEXUAL SELECTION AND HUMAN SEX DIFFERENCES</div>

To reproduce, women must at the very least invest an ovum (more metabolically expensive than a male spermatozoon), a metabolically expensive and risky pregnancy, and in traditional societies at least two years of costly breastfeeding. As a result, women have a lower potential rate of reproduction than do men, as with all other mammals. On the basis of Trivers' (1972) and Clutton-Brock's and Vincent's (1991) theories, not to mention Darwin (1871), men are predicted to compete more intensely for mates and women will more commonly exercise higher standards when it comes to choosing among them. Humans differ from most other mammals because men often invest in their offspring. Due to the costs of men' s investment, intrasexual competition between women and men's intersexual choice are found in our species (Geary, 1998); men and women have similarly high standards when choosing a long-term mate (Kenrick, Groth, Trost, & Sadalla, 1993), although they differ in the relative weighting of one trait (e.g. attractiveness) or another (e.g., income).

Due to a higher potential rate of reproduction and the ability to reproduce with minimal costs, men are predicted to show a higher preference than women for uncommitted sex, and women are predicted to show a higher preference for long-term commitment. The latter follows from the benefits that women can obtain for themselves and their children if men invest in a family. Both of these predictions have been conclusively confirmed (Buss, 1994; Clark & Hatfield, 1989; Kenrick, et al, 1993; Li, Bailey, Kenrick, & Linsenmeier, 2002).

Clark and Hatfield (1989) had attractive opposite-sex college-student confederates ask men and women students to go out with them on a date, accompany them to their apartment, or

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to go to bed with them. Men and women responded very similarly to the first question (about 50% of both sexes agreed to a date), but over 70% of men and none of the women agreed to go to bed with the confederate. Kenrick et al. (1993) asked men and women their minimum acceptable percentile ranking of intelligence of a dating, short-term sex, steady dating, or marriage partner. Whereas men and women chose very similar numbers for a dating, steady dating, or marriage partner, women's cutoff of minimum acceptable intelligence for a short-term sex partner was 10% higher than men's.

MATING COGNITIONS

Accompanying the behavioral sex differences, are a suite of inferred sex-specific cognitive mechanisms that have evolved, in theory, because they increase opportunities for short-term mating in men and increase the likelihood of securing a committed mate in women. These cognitions are not all or nothing or restricted to one sex or the other. As with many evolved traits, their expression is contingent on cost–benefit trade-offs in each specific context in general and with respect to each potential mate in particular. These trade-offs can be modeled and studied with use of a signal detection framework. In the following sections, I overview, respectively, signal detection theory, its relevance to the evolution of behavior in general, and to sex-specific mating cognitions in particular.

Signal Detection Theory

Accuracy when choosing one option or another in a problem solving task is one method behavioral researchers can use to make inferences about the underlying cognitive processing. Differentiating between types of inaccuracies can also be useful, as accuracy and inaccuracy can carry different costs and benefits from one situation to the next (MacMillan, 2002). A signal detection model (Table 1) allows researchers to differentiate between types of accuracies (true

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negatives vs. true positives) and between types of inaccuracies (false negatives, or Type II Errors, vs. false positives, or Type I Errors). In the social sciences, for example, researchers traditionally report "*p*-values" – measures of the probability of a Type I Error given achieved estimates of a parameter and its distribution – because false alarms are often perceived as more costly than misses. Whether this is a good assumption for academics remains to be determined, but in many other aspects of life, a Type II Error might be just as or more costly.

A signal detection framework may be especially useful for testing evolutionary hypotheses, because most evolved traits involve cost–benefit trade-offs; there is no optimal value for a trait, only relatively better or worse values depending on a host of other factors. When limited resources, such as nourishment, are spent on one adaptive trait (e.g., a metabolically expensive immune system) fewer resources are available for other traits (e.g., a large, complex, and metabolically expensive brain or expensive secondary sexual characteristics, as in the peacock's tail; Bailey & Geary, 2009; Roberts, Buchanan, & Evans, 2004). Therefore many peacocks, for instance, with an exceedingly large tail or an exceedingly high-functioning immune system will pay the price of reduced foraging ability and increased risk of predation.

Domain-specific decision-making strategies also carry costs and benefits. For example, a horse that sees a snake-like rope dragging through the grass and perceives it as a rope (i.e., a hit), might be more prone to the costly mistake of perceiving a dangerous rope-like snake as a rope (i.e., a miss, or a Type II Error). A horse that perceives a snake-like rope as a snake (i.e., a false alarm, or a Type I Error) might be more likely to perceive a dangerous rope-like snake as a snake (i.e., a correct rejection of the "rope" hypothesis). Since the costs of a Type II Error (e.g., venomous snakebite) have greatly outweighed the costs of a Type I Error (e.g., wasting energy running away), horses are prone to viewing a snake-like rope as a snake. Similarly, rhesus

monkeys have evolved a capacity to learn to be afraid of snakes or even toy snakes (the latter is a Type I error) but cannot learn to be afraid of flowers (leaving them open to a Type II error at the hands of a predatory flower), because a Type II error is more costly in the former case, but not in the latter case (Mineka & Cook, 1988).

Costs and Benefits of Inaccuracy

Human mating is especially appropriate domain for signal detection analyses. In the example of men's perception of women's sexual interest, a Type II error–missing a woman's cues of sexual interest–is common (Farris, Treat, Viken, & McFall, 2008) and more evolutionarily costly than a Type I error, that is, overestimating interest or seeing interest where it does not exist. Haselton and Buss (2000) hypothesized that men who under-perceive, and even those who accurately perceive women's sexual interest, will be and have been throughout human evolutionary history at a reproductive disadvantage relative to men who over-perceive women's sexual interest: A man who perceives that a woman is sexually interested in him might be more likely to pursue her as a mate. To the extent men who pursue initially uninterested women – or at least women who are uncertain –sometimes end up as their mates, this bias will be adaptive.

As noted, Haselton and Buss (2000) also hypothesized that women under-perceive men's level of commitment to a long-term relationship; their commitment to her and any children. For a woman perceiving a man's level of commitment, they hypothesized, a Type I error is more costly than a Type II error: Women who underestimate a potential mate's commitment level are more likely to psychologically test his commitment and through this they are more likely to choose truly a committed mate – one willing to maintain the relationship despite the costs of the commitment tests – and might have more success at maintaining a higher level of commitment in a relationship through continual commitment monitoring. If the reproductive costs of this

choosiness and monitoring (e.g., a smaller pool of potential mates) were lower than the reproductive benefits (e.g., high levels of paternal investment), inaccuracy in the perception of men's commitment would have been adaptive.

Indeed, Haselton's and Buss's (2000) data supported the hypotheses: Men rated women's actions such as "striking up a friendly conversation" or "smiling at a man at a party" as significantly more indicative of sexual interest than women rated the same actions performed by men towards women. Women, in contrast, were more likely to agree with such statements as "Men tend to be afraid of long-term commitments such as marriage," or "Men tend to keep their emotions to themselves in order to avoid making a commitment to a woman," as significantly more believable than men who rated the same statements with gender pronouns reversed. However, men's self-ratings of sexual interest were lower than women's ratings of men's sexual interest, indicating that men's over perception of women's sexual interest is not simply driven by "wishful thinking," but is somewhat specific to men's perception of female sexual interest. Similarly, men rate men and themselves as more committed than women rate men, whereas men rate women's commitment above where other women rate women's commitment, but below where women rate their own commitment

Despite some advantages to inaccuracy, indiscriminate inaccuracy is surely maladaptive. In the case of motion perception, some inaccuracy enables people to dodge or block an on-coming object, given the delay between perception and initiating a defensive movement. A higher degree of inaccuracy would result in premature defensive movements. In the case of an attacker using projectile weapons (e.g., stones), a premature defensive movement would result in the individual being less able to dodge or block a second projectile launched before the first had arrived (Geary, 1998). Similarly, I propose that indiscriminate inaccuracy is not adaptive in

men's over-estimation of women's sexual interest. Whereas a Type I error is less costly for a man perceiving sexual interest in a woman, it still carries potential costs, including damage to his reputation, risk of retaliation from the woman's partner, and fruitless pursuit of a would-be mate. Men's over-perception of women's sexual interest is only adaptive when the likelihood of a sexual interaction is greater than zero, with additional courting on the man's part. I am not asserting that men never err in this way even when the probability of a sexual interaction is zero, but I am predicting that men's over-estimation of women's sexual interest is calibrated by the degree of similarity between his desirability as a mate (henceforth, "mate value") and the woman's.

Because of men's strong preference for physical attractiveness in a mate (see Geary, 1998, for review), a woman's perceived mate value is influenced, in part, by her attractiveness. The traits that men find attractive in women (e.g., youth and waist-to-hip ratio of around 0.7) are linked to fertility (see *Ovulatory Cycle*, below), as would be expected of an evolved mate-choice bias. Corresponding with this bias is a mechanism designed to increase his chances of pursuing a woman with high mate value, but given the costs of pursuit – rejection, retaliation, lost time – only with a woman with whom he has some chance of mating. These men will have an evolutionary advantage over men with a mechanism designed to prompt indiscriminant pursuit of women; a woman with either higher mate value (one who would be more attractive, but less interested in him) or a woman with lower mate value (one who would be more interested in him, but less attractive).

Men's Mate Value and Mating Strategies

Individual differences in men's relative focus on mating effort and parental effort might also influence their sensitivity to women's fertility cues. Gangestad and Simpson (2000) explain

that because women are more concerned than men with commitment in their relationships, and because the costs of pregnancy are so high, women have evolved to be much less interested than men, on average, in casual sex, and most men will not have many short-term mating opportunities. Therefore, the few men who are likely to have many short-term mating opportunities might differ in their reproductive strategies from most other men. This principle is known as strategic pluralism. Simpson and Gangestad (1991) described these differences in terms of sociosexuality. Men with higher sociosexuality are more focused on achieving uncommitted sex than are other men, and have more sex partners. Men with higher sociosexuality might be more sensitive to cycle-related changes in fertility cues in all women, not just women of similar mate value.

Men's trade-offs may also vary with their perception of their own mate value. Surbey and Brice (2007) had participants fill out a fake "Personal Characteristics Questionnaire". Participants were told that they had scored very well on a "datability" scale. This manipulation increased men's self-perceived mate values, more than women's. Men had higher sociosexuality scores than women before the manipulation, as is often found (Penke & Asendorpf, 2008), and this gap increased after the manipulation. Consistent with hypotheses based on the strategic pluralism theory, analyses indicated that changes in self-perceived mate value and not changes in self-esteem drove the changes in sociosexuality scores. Therefore, a man's self-perceived mate value is also potentially relevant to his mating cognitions and behaviors.

Ovulatory Cycle

Humans are among the fewer than 5% of mammalian species in which males invest in offspring (Clutton-Brock, 1989; Geary, 2000). Men's parental investment, however, is facultative. The expression, or lack thereof, is contingent on a host of factors, including the benefit of investment to the physical and social well-being of their children, the nature of the spousal relationship, wider cultural rules for marriage and divorce (often created specifically to

ensure paternal investment), among other factors (see Geary, 2000, for review). Because children benefit from paternal investment, women who secure this investment have healthier and more socially competitive children in most contexts. Under these conditions, selection will favor adaptations that increase women's ability to secure and then to maintain paternal investment.

Concealed ovulation is among the traits that have been hypothesized to maintain long-term pair bonds and through this facilitate men's investment in children (Benshoof & Thornhill, 1979; Geary, 1998). When ovulation is clearly signaled (e.g., with estrus swellings), males' attention to and competition over females increases considerably and then declines once the ovulatory phase passes (Goodall, 1986). However, when ovulation is concealed, males have no way of differentiating between the likelihoods of conception at different times during the ovulatory cycle. Therefore, if ovulation is concealed, selection will favor males who maintain proximity and exclusive sexual access to specific females for an extended period of time. This in and of itself is not sufficient for the evolution of male parenting, but it is necessary.

Women are fertile during the five days before ovulation and on the day of ovulation, but not in other phases of their cycle (Wilcox, Weinberg, & Baird, 1995). Various physical traits that men find attractive in women change across women's cycles. In comparison to the non-fertile phases of the cycle, at ovulation women have decreased waist-to-hip ratio (Singh, Davis, & Randall; 2000), decreased ear, digit, and breast asymmetry (Manning, Scutt, Whitehouse, Leinster, & Walton; 1996), increased pupil width (Weissmahr, 2001), increased skin lightness (Van den Berghe & Frost, 1986), increased facial attractiveness (Roberts, et al; 2004), and increased voice attractiveness (Pipitone & Gallup, 2007). A substantial number of psychological changes at ovulation have also been observed (see Gangestad, Thornhill, & Garver-Apgar, 2005, for review)

These physical traits may be honest signals of women's fertility: For example, low waist-to-hip ratio in women is associated with higher levels of estradiol (Jasienska, Ziomkiewicz, Ellison,

Lipson, & Thune, 2004). Singh (1993) argued that perceptions of women's attractiveness have adaptive significance: Those men who perceived fertile and potentially fecund women, at the very least were more attentive and proprietary during this phase of their cycle (Flinn, 1988). Cyclic variation in appearance and behavior are sufficiently detectable (this detection need not be conscious) that they alter men's behaviors. Miller, Tybur, and Jordan (2007) found that normally cycling lap dancers made $15 more per hour while ovulating than when in the luteal phase (days immediately post ovulation) and $30 more per hour while ovulating than at menstruation. Haselton and Gangestad (2006) found that women reported more "mate guarding" behaviors by their partners at ovulation, and Flinn (1988) observed such mate guarding in a Caribbean village. In these studies, the direct causes behind the shifts in men's behavior are not fully understood, but imply detectable cyclic changes in women's behavior and appearance that affect how men respond to them.

CURRENT STUDY

Men's expenditure of time and resources on attempts to attract a mate is only adaptive when the likelihood of success is sufficiently great to outweigh the costs. This is not to say that men do not sometimes invest resources in pursuing women when there is no chance of a sexual interaction or any other type of relationship. My proposal is that they spend the most on women who are similar to them in mate value. I predict specifically that men's sensitivity to fertility cues (i.e., differences in appearance when ovulating vs. other points in the cycle) in women will vary with the degree of similarity between their mate value and the mate values of these women. A woman of similar mate value to a man is important for short-term as well as long-term relationships; these are women in the pool of potential mates. In the context of a long-term relationship, the man is faced with the risk of cuckoldry, which of course can only occur during the ovulatory phase of the woman's cycle. During this time, women report more fantasies about extra-pair men and men mate guard more. If the costs of mate guarding are high, then sensitivity

to ovulation may evolve in men and be associated with greater attentiveness to the woman; attentiveness is facilitated by changes in her appearance, which might reduce her interest in other men, as well as more explicit forms of mate guarding.

Figure 1 illustrates the predicted interaction between women's attractiveness, fertility, and receptivity to men's interest across men of average (Panel A), low (B) and high (C) mate value. The horizontal axis represents women's attractiveness on a scale of 0 (low) to 10 (high). The vertical axis lines represent probability and the curves represent the men's fitness functions. The negatively sloped lines represent the hypothetåical probability of the woman responding to the man's interest, and the positively sloped lines represent the woman's fertility; I assume a moderate positive correlation between attractiveness along the horizontal axis and fertility. (Fertility is a correlate of female attractiveness indicators, for example waist-to-hip ratio [DeRidder, et al, 1990; Kaye, Folsom, Prineas, Potter, & Gapstur, 1990], and attractive women show moderately higher indicators of physical health than unattractive women [Langlois, Kalakanis, Rubenstein, Larson, Hallam, & Smoot, 2000; Weeden & Sabini, 2005].) The curves represent the product of these variables, with maximum value for a man with mean mate value at the mean of women's attractiveness. In other words, the best outcome for a man of average mate value is to pursue a woman of average mate value. For a man with a lower than average mate value, the maximum would occur to the left, and to the right for a man with higher than average mate value.

If men's over-perception of women's sexual interest is adaptive in only some cases, then this and other aspects of men's mating psychologies will have evolved to motivate men to pursue the most attractive women who, at the same time, are likeliest to be responsive to their expressed interest. Specifically, my hypothesis is that a man's mate value influences his sensitivity to variation in attractiveness (and thus fertility) in potential mates. Because men rate women as

more attractive around the time of ovulation, presumably due in part to soft tissue changes that increase the woman's facial symmetry for instance, I can use this to assess men's sensitivity to the fertility of women who vary in physical attractiveness and mate value. Are men more sensitive to fertility changes in women of roughly the same mate value? This study will offer insight into the question of whether assortative mating is simply a by-product of all individuals' pursuing the best mates and being left with those of like mate value, as in Ellis's and Kelley's (1999) demonstration in which individuals were instructed to place a number they cannot see on their forehead and to "pair up" with the individual with the highest possible number, leaving the highest numbers together and the lowest numbers together; or whether it is at least in part due to other evolved aspects of men's mating psychologies.

Other factors might also mediate men's competence at or interest in discriminating between two similarly attractive women. If a woman is already in a relationship, then pursuing her as a mate carries added potential costs (Schmitt & Buss, 2001). Independent of the risk of her partner's retaliation, I assume that women with a partner are less likely to respond to another man's interest than are similarly attractive women without a partner. A woman's decreased receptivity to the courtship of other would-be mates results in additional costs to pursuing her as a mate. The negatively sloped lines in the second panel of Figure 2 represent this reduction in receptivity, and positively sloped lines again represent women's attractiveness. The curves, calculated as the products of these variables, represent overall fitness utility to the man. The maxima occur lower on both axes for mated women, indicating that to maximize the product of the probability of sexual interaction and women's attractiveness, a man should be less interested in women with partners, and disproportionably less interested in especially attractive women with partners.

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In other words, based on my model, high mate value men pursuing single attractive women gain the highest fitness utility from the mating pool. However, high mate value men pursuing slightly less attractive mated women gain higher fitness utility from the mating pool than high mate value men pursuing as-attractive mated women. This graphic can be well understood in the context of a linear model: Based on my model, a man's fitness utility from the mating pool is a function of his own mate value, his potential partner's attractiveness, and her partner status. Men's mate value, women's attractiveness, and women's single-ness produce positive main effects. However, men's mate value also interacts with women's attractiveness and single-ness, such that men gain more fitness utility from pursuing women of attractiveness similar to his level of mate value and single women. Lastly, women's single-ness interacts with their attractiveness, such that a man gains more fitness utility from pursuing mated women slightly less attractive than his level of mate value than mated women of his level of mate value, but higher fitness utility from pursuing a single woman at the same level of attractiveness as his level of mate value than in pursuing a single woman significantly more or less attractive than his level of mate value.

Based on this model, selection should favor men who are most sensitive to attractiveness/fertility differences in women of similar mate value. Selection should favor those men who can most efficiently distinguish fertility differences among these women, and men who are sensitive to potential moderators of the probability of attaining a woman as a mate, such as partner status (men should be better at detecting fertility differences in women with a non-dominant partner) and mate value changes (men's "ranges" of potential mates change as their mate value changes).

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METHODS

Participants

A total of 153 male university undergraduates participated in the study for course credit. Of these, 3 reported themselves to be non-heterosexual, and 2 chose not to complete the experiment. Only data from the 148 men who reported themselves to be heterosexual and completed the entire experiment were used in the analyses.

Stimuli

Durante, Li, and Haselton (2008) and Durante, Hill, Perriloux, and Li (2008) collected data on 164 women's clothing preferences during ovulation and at other cycle phases. Durante, Li, and Haselton measured ovulation with a urine test for Luteinizing Hormone (LH), the hormone that precedes the release of an ovum. Researchers photographed the participants at a high-fertility and a low-fertility session; women dressed as they pleased. On average, high-fertility testing sessions took place .23 days after the LH surge (*SD*=1.72), that is, .77 days before the day-of-ovulation (*SD*=1.72). Low-fertility sessions were scheduled at least six days after the LH surge or at least three days before the onset of their menstrual period. On average, low-fertility testing sessions took place 5.65 days prior to menses (*SD*=2.88). In Durante's, Hill's, Perriloux's, and Li's (2008) first study, high-fertility testing sessions took place .71 days, on average, after the LH surge (*SD*=1.18) and .29 days before day-of-ovulation (*SD*=1.18). Low-fertility sessions were scheduled six or more days post-LH surge or at least three days prior to menstrual onset. On average, low-fertility testing sessions took place 4.46 days prior to menses (*SD*=3.22). In Durante's, Hill's, Perriloux's, and Li's (2008) second study, high-fertility testing sessions took place, on average, .78 days after the LH surge (*SD*=.81) and .24 days before day-of-ovulation (*SD*=.77). On average, low-fertility testing sessions took place 4.76 days prior to menses (*SD*=3.56). In all, 95 participants completed high-fertility testing first and 69 completed

low-fertility testing first. Since some of the women were missing photographs from one session, and since others' photos were slightly distorted, 116 pairs of photographs were used in the current study.

Reaction Time

A well-designed mechanism for detecting fertility differences among similarly attractive women might allow for both greater accuracy and efficiency in fertility detection. Therefore, I measured the reaction time for each trial.

Self-Perceived Mate Value

To measure the self-perceived mate value (SPMV), I used the Self-Perceived Mating Success scale (see Appendix A; Lalumière & Quinsey, 1996). The measure includes 10 items that assess one's perception of the extent to which members of the opposite sex perceive them as desirable. This tool is reliable (alpha = .87) and has been previously used in studies of mate value (e.g., Surbey & Brice, 2007).

Mate Value Manipulation

This study replicated the SPMV manipulation developed by Surbey and Brice (2007). Participants completed a "Personal Characteristics Questionnaire" (Appendix B), and were informed that they scored 92 out of a possible 100 on the "Hartford and Goldsmith Datability Scale," a score "significantly higher than average." Surbey and Brice found that this manipulation significantly increased self-perceived mate value, increased men's mate value more than women's, and resulted in an increase men's focus on casual sex.

Male Rival Manipulation

Pictures of men varying in physical attractiveness were selected from a large photo database of college-aged individuals.

SOI-R

The Revised Sociosexual Orientation Inventory (SOI-R; Simpson & Gangestad, 1991; see Appendix C) measures an individual's attitudes and previous actions concerning uncommitted sex.

Furthermore, this variable is positively related to men's self-perceived mate value (Lalumière, Seto, & Quinsey, 1995; as cited in Surbey & Brice, 2007). Surbey and Brice found that false "datability" feedback increased men's SOI attitudes.

Procedure and Dependent Variables

First, participants completed the Self-Perceived Mating Success scale and the SOI-R. In a computerized forced-choice task using the photos from both Durante et al. (2008) studies, participants chose the photograph in which the woman looks more attractive. The photos of the same woman taken around the time of ovulation and at nonfertile times in their cycle were presented side-by-side, and participants were instructed to choose as quickly as possible. In the rival male condition, participants viewed a random fourth of the photographs and rated the dominance of a man who was described as the woman's boyfriend before each pair of the woman's photographs was presented.

In section I, participants first completed the choice task for a random fourth of the photographs and in section II the rival male task for another random fourth of photographs. The computer stored reaction times, as well as the accuracy in fertility detection, of each participant. In this case, a "miss" would consist of a man choosing the photograph of the woman during a non-fertile cycle phase, and a hit would consist of a man choosing the photograph of the ovulating woman. They repeated this activity for a random fourth of the 116 sets of photographs.

Participants underwent the mate value manipulation after rating the second set of photos: They completed the computerized Personal Characteristics Questionnaire and received their false score from the "Hartford and Goldsmith Datability Scale". For a manipulation check, participants again completed the Self-Perceived Mating Success scale and the SOI-R. Then, in section III participants completed the choice task and in section IV the rival male condition for the next two random sets of photographs. Again, those participants in the male rival condition viewed photographs of the woman's partner before the photograph pairs were presented. Finally, participants were asked their sexual orientation.

RESULTS

Female Attractiveness

Two independent judges rated the attractiveness of the women on 1 (low) to 9 (high)

point scale, and showed acceptable agreement (ICC = 0.64; 95% confidence interval = [0.54,

0.72]). Analyses use the mean of these ratings as an indicator of female attractiveness.

Manipulation Check

Consistent with Surbey's and Brice's (2007) findings, participants' SPMV scores

increased significantly after receiving false feedback about their "datability" (t[148] = 2.95, p =

0.003). Inconsistent with Surbey's and Brice's findings, SOI-R scores decreased after the

manipulation (t[148] = -2.59, p = 0.011). However, again consistent with Surbey's and Brice's

findings, individuals whose SPMV scores increased were also likely to show an increase in SOI

attitudes (r = 0.23, t[147] = 2.93, p = 0.004).

Reaction Time

Two variables were created to examine the effects of mate value differences on fertility

detection. The first, "mate value difference", is the difference between standardized (*M* = 0, *SD* =

1) attractiveness of the women and the men's standardized baseline SPMV score. A value of -1

indicates that the man's SPMV z-score is 1 *SD* higher than the target woman's physical

attractiveness z-score, whereas a value of 1 would indicate that the woman's physical

attractiveness z-score is 1 *SD* higher than the man's SPMV z-score. The distributions of the

variable, mate value difference, the variables used to create it, and RT, are displayed in

Appendix D.

To test the prediction that men's sensitivity to the fertility status of the women will vary

with the mate value difference in a curvilinear pattern, I performed separate regressions for each

of the four rating sections with mate value difference and its quadratic component predicting RT. To reduce collinearity in these regressions and those in the following sections, the quadratic component of the mate value difference variable is the square of the centered ($M = 0$, $SD = 1$) mate value difference variable. The corresponding functions, across each section's range of mate value difference, are shown in Figure 3, and the actual regressions in Table 2.

Section I is for men's ratings before the mate value manipulation and for women without a partner, and yielded a significant positive quadratic component (t[4202] = 2.43, p = 0.02) and a significant negative linear component (t[4202] = -6.51, p < 0.001). The corresponding curvilinear pattern had a function minimum at mate value difference = 2.72 (for calculation of function extrema, see Table 3). Section II is for men's ratings before the mate value manipulation and for women with a partner, and yielded a significant positive quadratic component (t[4202] = 2.42, p = 0.02) and a significant negative linear component (t[4202] = -2.62, p = 0.009). The corresponding curvilinear pattern is similar to that in Section I but with a function minimum at mate value difference = 1.09. Section III is for men's ratings after the mate value manipulation and for women without a partner and yielded a significant positive quadratic component (t[4202] = 2.46, p = 0.01) and a significant negative linear component (t[4202] = -2.54, p = 0.01). The function is almost identical to that in Section II, with a minimum at mate value difference = 1.00. Section IV is for men's ratings after the mate value manipulation and for women with a partner, and yielded non-significant negative quadratic and linear components (t's [4202] = -0.28, -1.08; p's = 0.78, 0.28).

Fertility Detection

Fertility detection was operationalized as "preferring the ovulating target." Overall, participants preferred the picture in which the woman was ovulating in 64/116 (55%) of the

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photo pairs. This is not significantly higher than chance (assuming participants are guessing, p = 0.11), but does not address the hypothesis that mate value difference will affect fertility detection.

To explicitly test this hypothesis, I performed logistic regressions with mate value difference and its quadratic component predicting fertility detection, separately for each section. Section I yielded a significant negative quadratic component (t[4202] = -2.78, p = 0.005) and a significant positive linear component (t[4202] = 2.32, p = 0.02), indicating that fertility detection varied in a statistically significant curvilinear pattern, with a maximum at mate value difference = 1.69. Section II yielded non-significant negative quadratic and linear components (t's [4202] = -0.08, -1.26; p's = 0.94, 0.21), suggesting raters might be better at detecting fertility in women less attractive than themselves. Section III yielded a non-significant negative quadratic (t[4202] = -0.44, p = 0.65) and a significant positive linear component (t[4202] = 3.27, p = 0.001), meaning that men were significantly better at detecting fertility of women more attractive than themselves. Section IV yielded a trend for a negative quadratic (t[4202] = -1.88, p = 0.06) and a non-significant negative linear component (t[4202] = -1.10, p = 0.27), indicating a trend toward a curvilinear pattern similar to that in Section I, but a maximum value at mate value difference = -0.54.

These regressions are shown in Table 4. The resulting models from these regressions are shown in Figure 4. The Y-axes have been exponentially transformed (Y' = exp[Y]), so the Y values represent odds ratios. Specifically, the odds of preferring the ovulating woman over the non-ovulating woman; a ratio of 1.0 is equivalent to chance (i.e., guessing) levels of detection. To illustrate, for the first set of photos (Section I: Figure 4, Panel A), when the mate value difference is 0, men are between 1.6 and 1.7 times more likely to prefer the ovulating woman

than the non-ovulating woman. This value peaks around 1.7 when the woman's attractiveness z-score is 1 *SD* greater than the man's SPMV z-score.

Lowess Functions

Lowess functions for each section, with smoother span (i.e., the proportion of observations used to calculate each smoothed value) = 2/3, 3 robustifying iterations, and delta = 0.01, are displayed in Figure 5. The x-axis is mate value difference, and the y-axis is the natural log (i.e., *ln*, or log with base *e*) of the odds of fertility detection. Lowess curves are smooth, because they estimate several functions for a given range of the predictor variable, across the entire predictor variable, and allow for a more precise examination of curvilinearity than linear models with quadratic terms.

The Lowess functions for Sections I, II, and IV resemble the quadratic functions fit to these data (Fig. 4). However, the Lowess function for Section III resembles a logistic function with a large range (approximately 2 units of mate value difference) of high values of the criterion.

Dominance

I created the variable "dominance difference," which, similarly to mate value difference, was the difference between dominance z-score for the man paired with the rated woman and SPMV z-score. For Section IV, I used the SPMV assessed after the mate value manipulation. High values of dominance difference indicate that the pictured male's dominance was higher than the rater's SPMV.

Dominance difference did not predict unique variance in fertility detection in Section II, yielding a weak trend toward a negative linear relationship ($t[4201] = -0.929$, $p > 0.30$). However, dominance difference did predict unique variance in fertility detection in Section IV,

yielding a significant negative linear effect (t[4201] = -3.190, p = 0.001). Furthermore, Lowess functions (Figure 6) indicate that in both conditions, men were most likely to detect fertility in partners of relatively non-dominant men, whereas men were least likely to detect fertility in partners of relatively dominant men.

DISCUSSION

These data provide some evidence that men are differentially sensitive to the ovulatory status of women, possibly indicating a a flexible and specialized mechanism designed to motivate men to pursue the most fertile women with whom they have a chance of attaining as a mate. I will review this evidence, discuss the experiment's limitations, and propose further implications from this study.

Mate Value Manipulation

I replicated Surbey's and Brice's (2007) core findings: SPMV scores increased significantly after receiving false feedback about one's "datability," and men who increased in SPMV showed an increase in favorable attitudes about casual sex. However, I did not replicate Surbey's and Brice's overall finding of more favorable attitudes toward casual sex after their datability manipulation. I found instead that false feedback about one's datability resulted in less favorable attitudes about casual sex. This finding was not predicted by theory: It is theoretically unclear why individuals would increase, on average, in SPMV, and that this increase would be correlated with SOI attitudes, but that SOI attitudes scores would decrease, on average. Furthermore, this finding is inconsistent with a previous finding, though this was not a perfect replication of Surbey's and Brice's experiment. This result might also be due to influential outliers (for a graphic and discussion, see Appendix E). Regardless, the finding that SOI scores decreased, on average, after the mate value manipulation warrants follow-up.

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Fertility Detection and Mate Value Difference

As predicted, the odds of men correctly detecting fertility status peaked for women of slightly higher relative mate value. In other words, men did no better than chance at detecting fertility differences in women in the entire sample, but were significantly better than chance at detecting fertility differences in women who were of about the same relative mate value, with a bias toward increased sensitivity to women with a mate value that is somewhat higher than themselves.

The Section I panel from Figure 4 shows the relation between the odds of correctly detecting ovulation and the difference in mate value comparing the man and the women being rated. Importantly, the relation is similar to that shown in the first panel of Figure 1. The similarity provides support for the hypothesized relationship between mate value difference and fertility detection, but with the function maximum occurring to the right of where it was predicted. Men's peak accuracy was for women of slightly higher, not equal mate value. The Section I panel from Figure 3 indicates that the men were taking less time to evaluate photo pairs for women of moderately higher mate value than themselves and longer for women of significantly lower or higher mate value. The minima for this function did not correspond exactly to the maxima for fertility detection, but nonetheless indicates that men's accuracy at detecting the fertility of slightly more attractive women than themselves is not due to slow, careful comparisons of the photographs, but rather occurred quickly.

The Section II panel from Figure 4 indicates that when men view photos of a male partner before rating the target photos, the relationship between fertility detection and mate value difference weakens and changes shape. In this situation, there is a trend toward higher odds of fertility detection in relatively less attractive women, in keeping with the gist (if not the function

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shape) of the prediction represented in Figure 2. Comparison between the Section I and Section II panels from Figure 3 indicates that men rated less attractive women more quickly when they had a partner, meaning that the increase in odds of fertility detection tracked the decrease in RT, though not to a great extent.

The Section III panel from Figure 4 indicates that after increasing men's perceived mate value, they were significantly more accurate in detecting the fertility of women of higher mate value than themselves. However, in this situation, the faster RTs for accurately detecting fertility did not emerge; the curve from the Section III panel in Figure 3 was predicted to shift to the right of the Section I curve but it did not. The Section IV panel from Figure 4 indicates that after increasing men's perceived mate value and having them rate partnered women, the effects of the SPMV manipulation appear to have been "canceled out". The result is a pattern similar, though shifted slightly to less attractive women, to their baseline sensitivity to fertility.

Dominance difference significantly negatively predicted the odds of fertility detection in Section IV, but not in Section II. Consistently with predictions, Figure 6 indicates that in both sections, raters were least likely to detect fertility in partners of relatively dominant men, and most likely to detect fertility in partners of relatively non-dominant men. This result implies that men are less likely to pursue women with high-dominance partners than women with low-dominance partners, and is consistent with the proposed cost-benefit framework (Fig. 2).

Limitations

Raters showed only moderate agreement in their ratings of the women's attractiveness. However, this is only likely to have increased the error in the regressions, thereby decreasing power (i.e., the probability of rejecting the null hypothesis). Therefore, this limitation did not likely alter the major conclusions from this experiment.

Participants and targets were sampled from a restricted range of potential mate values, since all were university students, and since all participants went to the same university, and all targets went to the same university. Furthermore, the operationalization of fertility detection as preferring the photo of an ovulating woman necessarily restricts the potential range of mate values (i.e., 0, 1), since all women must be ovulatory. However, while this limitation likely decreased the power of regressions reported in the study, restriction of range does not bias estimates of unstandardized regression weights. Therefore, the general direction of the linear trend in Section II (Fig. 4) and the general quadratic trend in Section IV (Fig. 4) are still somewhat interpretable. In other words, the ranges of target and rater mate value, and therefore the range of mate value difference are small in this sample. Therefore, this design did not allow for a thorough understanding of the odds of fertility detection as a function of mate value difference over a long enough interval to be able to observe a clear quadratic function as that in Figure 1. So, again, this limitation did not likely alter the major conclusions from this experiment.

I did not observe predicted function maxima in the regressions of mate value difference predicting fertility detection in Sections II and III (Fig. 4), and the function maximum for the regression for Section I is to the right of where it was predicted. This could be due in part to limitations in two areas. The restricted ranges of values of mate value might have rendered our ability to observe a function maximum in Sections II and III difficult, since a 1 standard deviation mate value difference in this sample might actually correspond to a much smaller difference in a representative sample. The linear trends in Sections II and III are consistent with this hypothesis.

Also, the extent to which the mean attractiveness for the targets "lines up" with the mean SPMV for the raters is unclear. For example, if raters perceived themselves as having especially high mate value, the mean rater's SPMV might correspond to a point higher than the mean of women's attractiveness. Data are consistent with this possibility, since the male raters were most accurate in fertility detection for targets with attractiveness z-scores somewhat higher than their SMPV z-scores. Therefore, the mate value difference scale might lack a "true" 0 point. However, major findings remain unchanged, even assuming that the mate value difference scale is an interval scale, rather than a ratio scale.

It is possible that different men use different mating strategies. That is, some men might be selected (perhaps through frequency-dependent selection, or perhaps through an adapted gene * environment interaction) to be more sensitive to fertility changes in women of relatively higher or lower mate value than themselves. While the Lowess curves (Fig. 5) do not provide convincing evidence of bi- or multi- modality in the ranges of most accurate fertility detection, bimodality is not a sophisticated criterion for identifying mixtures (Gangestad & Snyder, 1985; Meehl & Golden, 1982). Therefore, it is possible that these data are actually comprised of mixtures, and further research with a larger sample might address this.

Implications

The basic finding is that men are no better than chance at detecting women's ovulatory status and thus fertility, when men rate the attractiveness of a random sample of women. A sensitivity does emerge, however, when the relative mate value of the man is calibrated to that of the woman, and with respect to whether the woman has a partner or not. Men are particularly sensitive to the ovulatory status of single women of slightly higher mate value than themselves and make this determination quickly. Increasing a man's perceived mate value results in

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heightened sensitivity to the ovulatory status of very attractive women more so than less attractive women. Pairing a woman with a male partner shifts men's sensitivity to ovulatory status such that they are particularly sensitive to women of lower mate value than themselves. Simultaneously enhancing men's mate value and pairing women with partners returns them to their baseline sensitivity. In short, men can detect change in fertility status of women, but their sensitivity to this change is dependent on the relative mate value of the man and the woman and on whether the women is single or paired.

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Table 1: *Signal detection table, with* Type I *and* Type II *errors labeled*

		Objective reality	
		TRUE	**FALSE**
Subjective	**TRUE**	Hit	False alarm (*Type I Error*)
perception	**FALSE**	Miss (*Type II Error*)	Correct rejection

Table 2: *Regression Equations of RT as a Function of Mate Value Difference by Section*

Section:	Coefficients:	Estimate	Std. Error	t value	Pr(>|t|)	
	Ratings Without Partner and Before Mate Value Manipulation					
I	(Intercept)	3168.81	43.95	72.101	<2e-16	
	MV Difference	-157.83	24.25	-6.509		8.46E-11
	MV Difference^2	28.98	11.94	2.426		0.0153

	Ratings With Partner and Before Mate Value Manipulation					
II	(Intercept)	3191.19	44.96	70.978	<2e-16	
	MV Difference	-65.98	25.21	-2.617		0.0089
	MV Difference^2	30.24	12.51	2.416		0.0157

	Ratings Without Partner and After Mate Value Manipulation					
III	(Intercept)	3176.56	44.89	70.764	<2e-16	
	MV Difference	-66.75	26.24	-2.544		0.011
	MV Difference^2	33.48	13.59	2.464		0.0138

	Ratings With Partner and After Mate Value Manipulation					
IV	(Intercept)	3277.938	44.391	73.842	<2e-16	
	MV Difference	-29.855	27.65	-1.08		0.28
	MV Difference^2	-4.228	14.867	-0.284		0.776

Table 3: *Calculation of Function Extrema*

Regression:	Model Expression:	Derivative:	Extrema:
	Reaction Time		
Section I	$28.98X^2 - 157.83X + 3168.81$	$57.96X - 157.83$	2.72
Section II	$30.24X^2 - 65.98X + 3191.19$	$60.48X - 65.98$	1.09
Section III	$33.48X^2 - 66.75X + 3176.56$	$66.96X - 66.75$	1.00
	Fertility Detection		
Section I	$-0.0072X^2 + 0.0122X + 0.5241$	$-0.0144X + 0.0244$	1.69
Section IV	$-0.0060X^2 - 0.0065X + 0.5279$	$-0.0120X - 0.0065$	-0.54

Table 4: *Regression Equations of Fertility Detection as a Function of Mate Value Difference by*

Section

Section:	Coefficients:	Estimate	Std. Error	t value	Pr(>|t|)
	Ratings Without Partner and Before Mate Value Manipulation				
I	(Intercept)	0.5241	0.0095	55.066	<2e-16
	MV Difference	0.0122	0.0053	2.323	0.0202
	MV Difference^2	-0.0072	0.0026	-2.784	0.0054

	Ratings With Partner and Before Mate Value Manipulation				
II	(Intercept)	0.5420	0.0095	57.120	<2e-16
	MV Difference	-0.0067	0.0053	-1.260	0.2080
	MV Difference^2	-0.0002	0.0026	-0.080	0.9360

	Ratings Without Partner and After Mate Value Manipulation				
III	(Intercept)	0.5066	0.0096	52.795	<2e-16
	MV Difference	0.0183	0.0056	3.266	0.0011
	MV Difference^2	-0.0013	0.0029	-0.444	0.6573

	Ratings With Partner and After Mate Value Manipulation				
IV	(Intercept)	0.5279	0.0095	55.726	<2e-16
	MV Difference	-0.0065	0.0059	-1.098	0.2721
	MV Difference^2	-0.0060	0.0032	-1.878	0.0604

Figure 1: *The Predicted Relations Among Women's Attractiveness, Probability of a Romantic Relationship, and Utility of Mate Pursuit for Men with Average, Low, and High Mate Values*

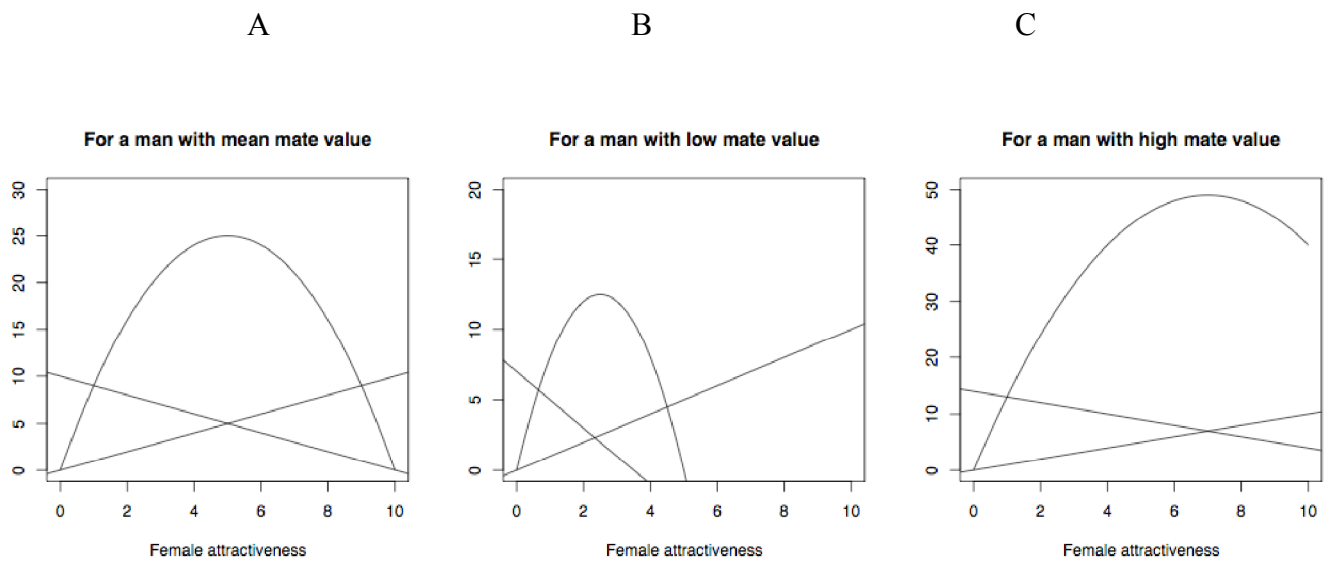A   B   C
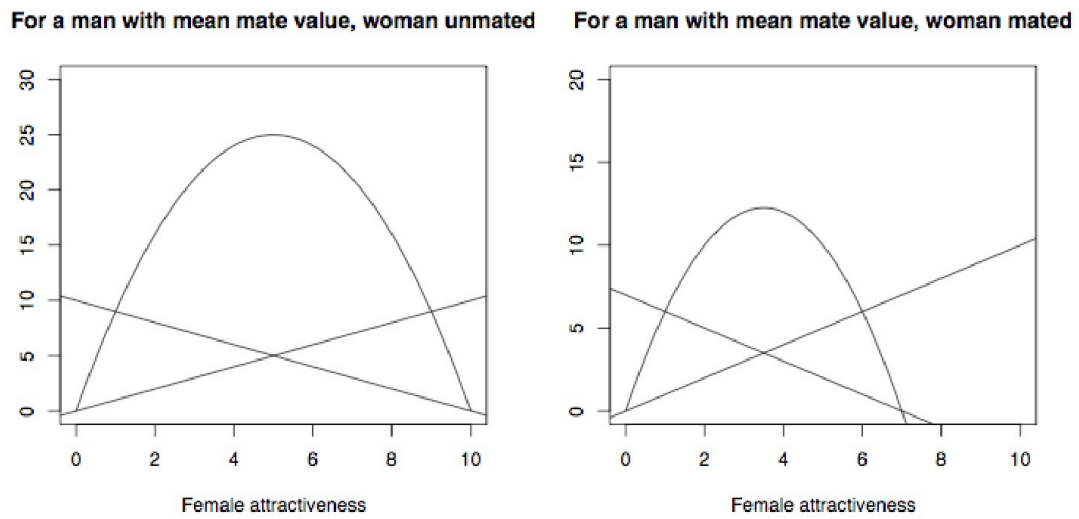
Figure 2: *Change in Men's Utility of Mate Pursuit of Women without and With a Partner*

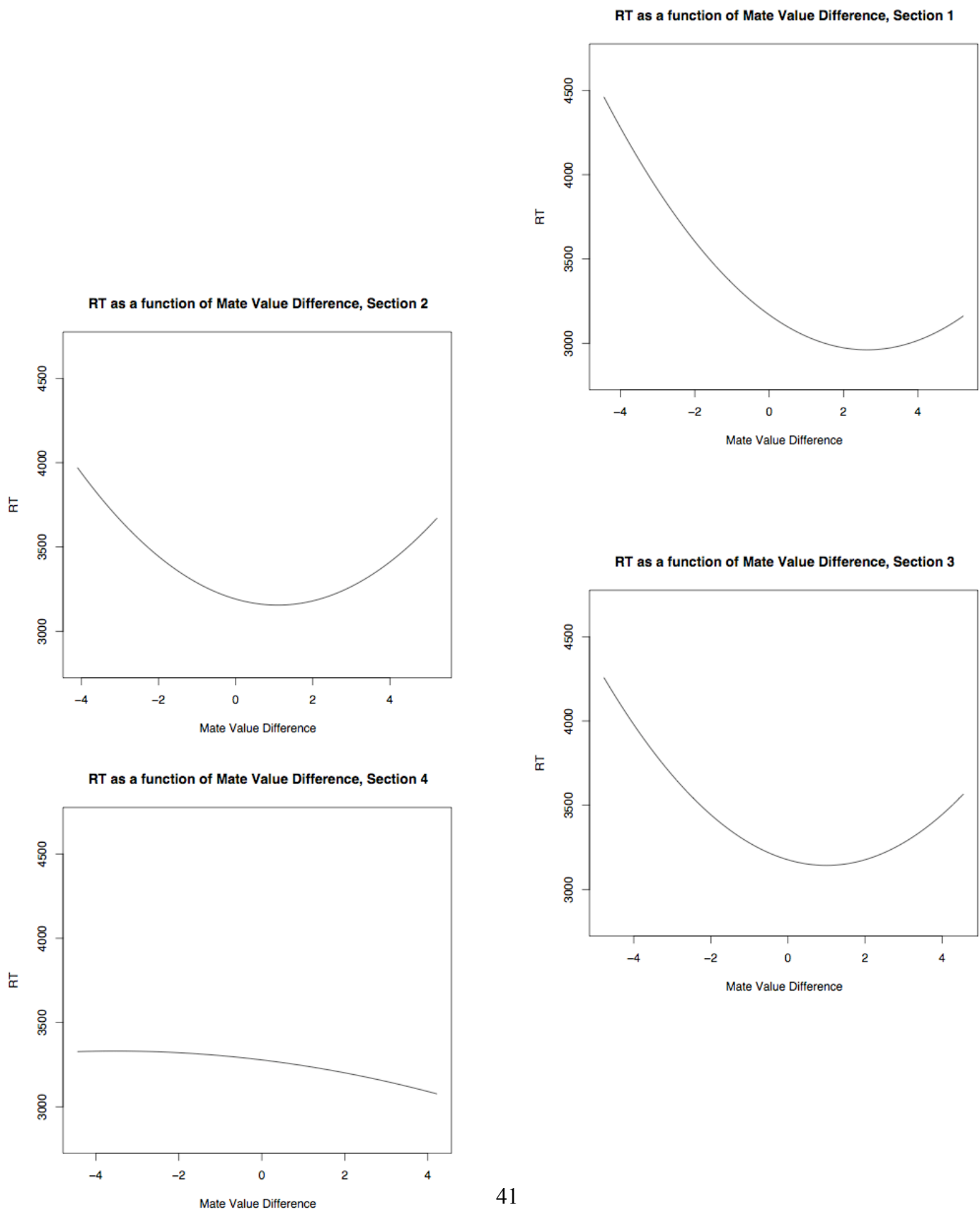Figure 3: *Reaction Time for Ratings of Women's Attractiveness as a Function of Mate Value*

Difference

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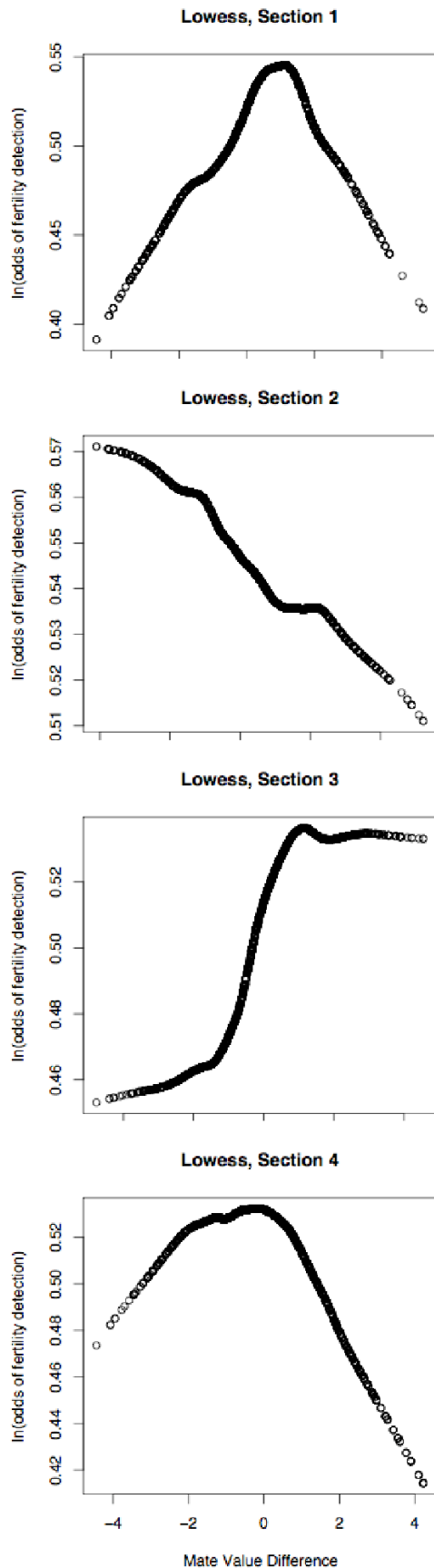Figure 4: *Accuracy of Detecting Fertility as a Function of the Mate Value Difference*

42
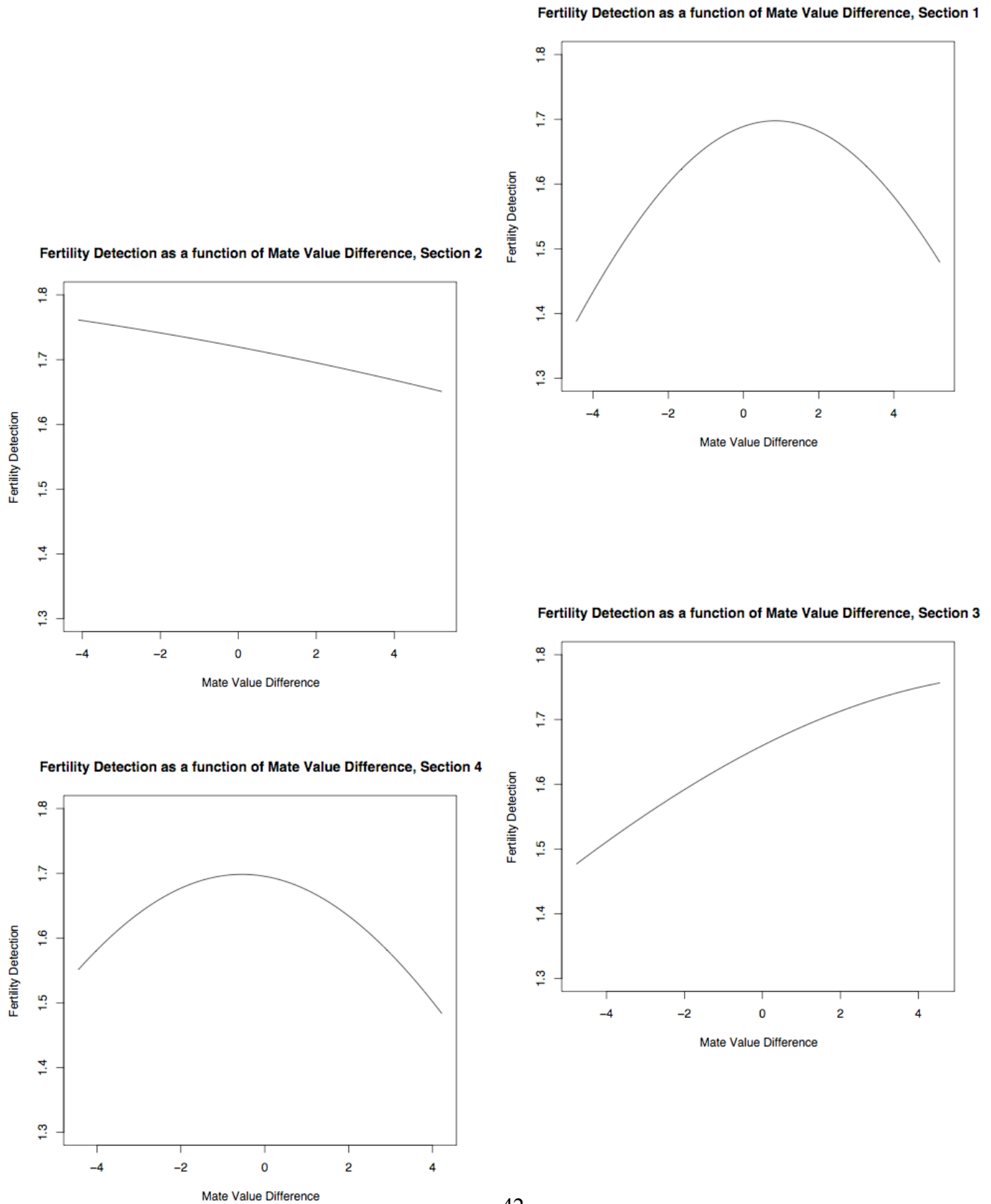
Figure 5: *Lowess Functions of Fertility Detection Accuracy as a Function of the Mate Value Difference*


A y-value of 0.60 corresponds to a 64.57% chance of fertility detection; a y-value of 0.50 corresponds to a 62.25% chance of fertility detection; a y-value of 0.40 corresponds to a 59.87% chance of fertility detection.

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Figure 6: *Lowess Functions of Fertility Detection Accuracy as a Function of Dominance*

Difference
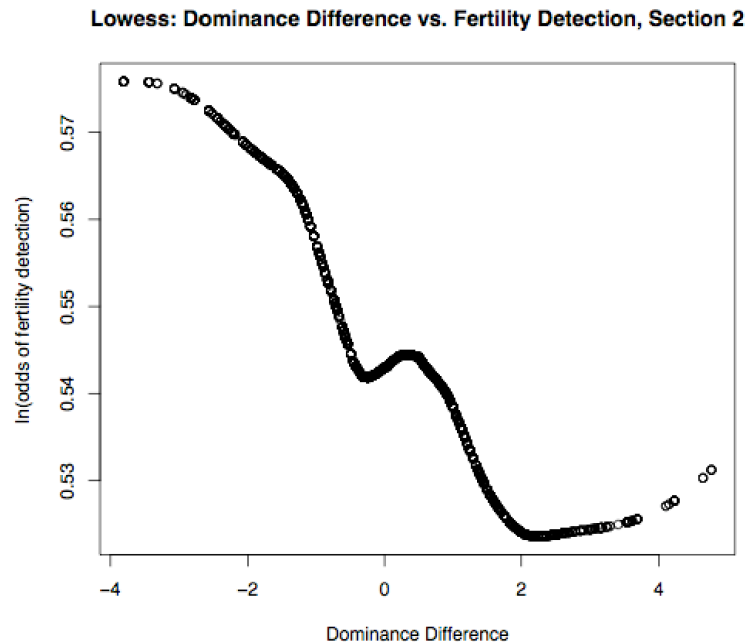
Lowess: Dominance Difference vs. Fertility Detection, Section 2

A y-value of 0.60 corresponds to a 64.57% chance of fertility detection; a y-value of 0.50 corresponds to a 62.25% chance of fertility detection; a y-value of 0.40 corresponds to a 59.87% chance of fertility detection.

Lowess: Dominance Difference vs. Fertility Detection, Section 4
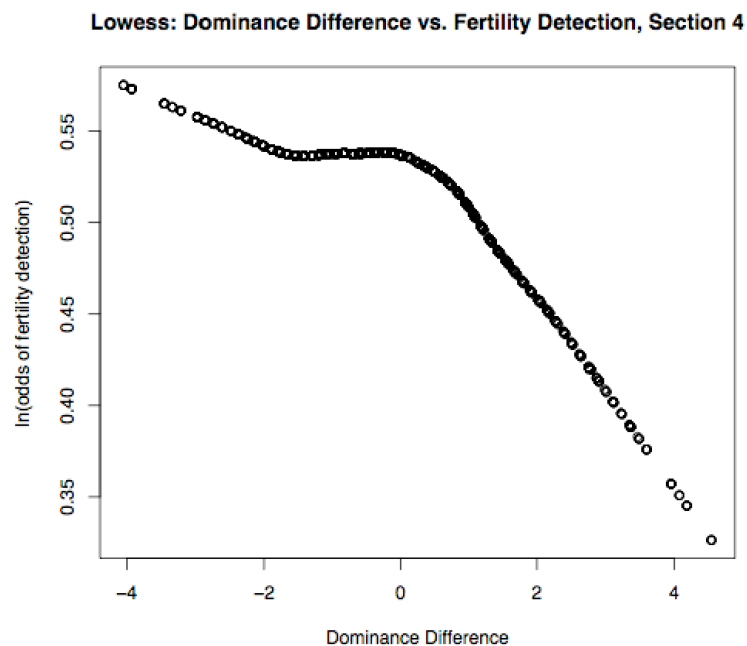
The revised Sociosexual Orientation Inventory (SOI-R)

Please respond honestly to the following questions:

1.   With how many different partners have you had sex within the past 12 months?

□	□	□	□	□	□	□	□	□
0	1	2	3	4	5-6	7-9	10-19	20 or more

2.   With how many different partners have you had sexual intercourse on *one and only one* occasion?

□	□	□	□	□	□	□	□	□
0	1	2	3	4	5-6	7-9	10-19	20 or more

3.   With how many different partners have you had sexual intercourse without having an interest in a long-term committed relationship with this person?

□	□	□	□	□	□	□	□	□
0	1	2	3	4	5-6	7-9	10-19	20 or more

4.   Sex without love is OK.

1 □   2 □   3 □   4 □   5 □   6 □   7 □   8 □   9 □
Strongly disagree   Strongly agree

5.   I can imagine myself being comfortable and enjoying "casual" sex with different partners.

1 □   2 □   3 □   4 □   5 □   6 □   7 □   8 □   9 □
Strongly disagree   Strongly agree

6.   I do *not* want to have sex with a person until I am sure that we will have a long-term, serious relationship.

  1 □   2 □   3 □   4 □   5 □   6 □   7 □   8 □   9 □

Strongly disagree   Strongly agree

7.   How often do you have fantasies about having sex with someone you are *not* in a committed romantic relationship with?

□ 1 – never

□ 2 – very seldom

□ 3 – about once every two or three months

□ 4 – about once a month

□ 5 – about once every two weeks

□ 6 – about once a week

□ 7 – several times per week

□ 8 – nearly every day

□ 9 – at least once a day

8.   How often do you experience sexual arousal when you are in contact with someone you are *not* in a committed romantic relationship with?

□ 1 – never

□ 2 – very seldom

□ 3 – about once every two or three months

□ 4 – about once a month

□ 5 – about once every two weeks

□ 6 – about once a week

□ 7 – several times per week

□ 8 – nearly every day

□ 9 – at least once a day

9.   In everyday life, how often do you have spontaneous fantasies about having sex with someone you have just met?

□ 1 – never

□ 2 – very seldom

□ 3 – about once every two or three months

□ 4 – about once a month

□ 5 – about once every two weeks

□ 6 – about once a week

□ 7 – several times per week

□ 8 – nearly every day

□ 9 – at least once a day

Appendix B:

Personal Characteristics Questionnaire and Hartford and Goldsmith Datability Rating from Surbey and Brice (2007)

1) How old are you?

2) How tall are you?

3) How much do you weigh?

4) What color is your hair?

5) What color are your eyes?

6) What is your current annual income?

7) What is your expected annual income in 5 years?

8) Are any parts of your body pierced?

9) Do you have any tattoos?

10) How long is your hair?

11) Do you have a good sense of humor?

12) Are you outgoing?

13) How intelligent are you?

Hartford and Goldsmith Datability Rating

In 1992, Hartford and Goldsmith devised a paper and pencil test to assess datability. This test is a measure of your desirability as a potential date and is based on the reports of 218 females, and 195 males of the relative importance of a number of traits related to the consideration of a potential date. Based on your responses to the Personal Characteristics Questionnaire, your achieved a datability score of:

92 out of a possible 100

This result is significantly higher than average.

Appendix C

SPMV

Please indicate how strongly you agree or disagree with each of the following statements using a scale of 1 through 7, where "1" means Strongly Disagree and "7" means Strongly Agree.

1. Members of the opposite sex that I like, tend to like me back. _____

2. Members of the opposite sex notice me. _____

3. I receive many compliments from members of the opposite sex. _____

4. Members of the opposite sex are not very attracted to me. _____

5. I receive sexual invitations from members of the opposite sex. _____

6. Members of the opposite sex are attracted to me. _____

7. I can have as many sexual partners as I choose. _____

8. I do not receive many compliments from members of the opposite sex. _____

9. Relative to my peer group, I consider myself:

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

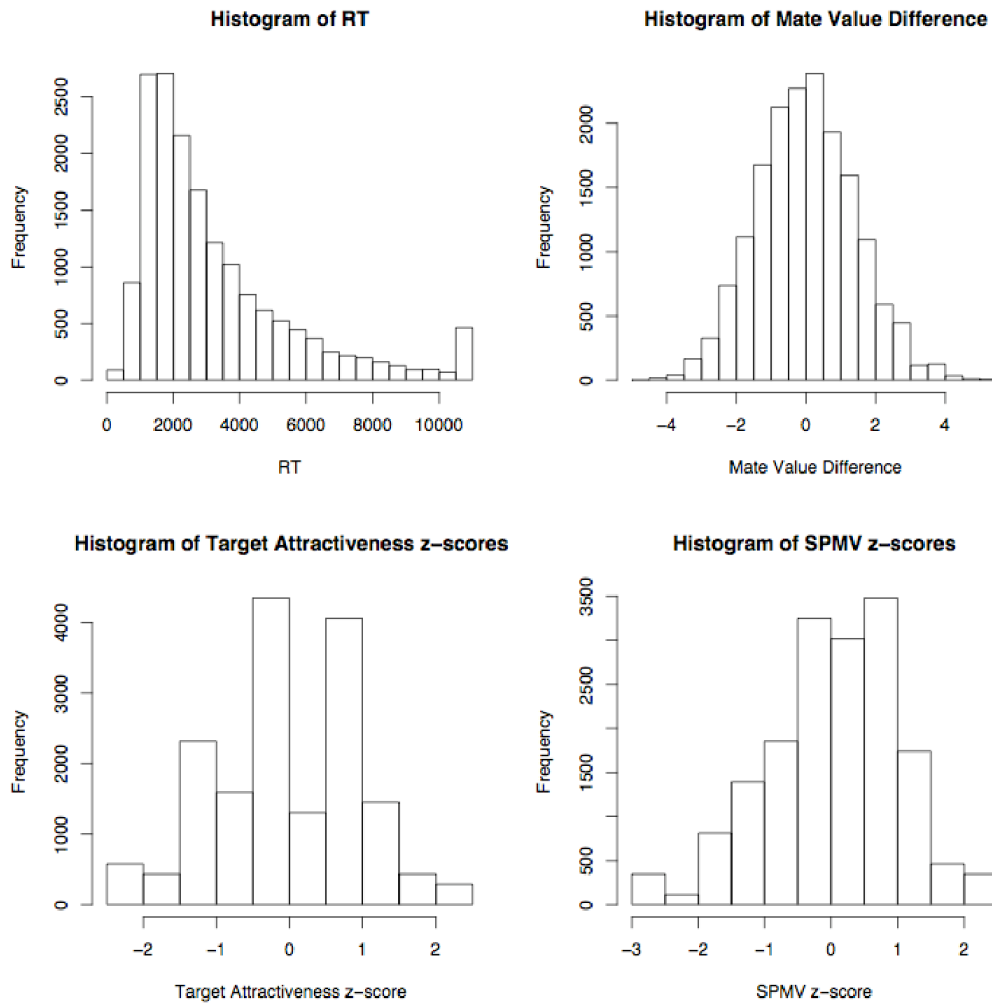Much less   Much more

attractive   attractive
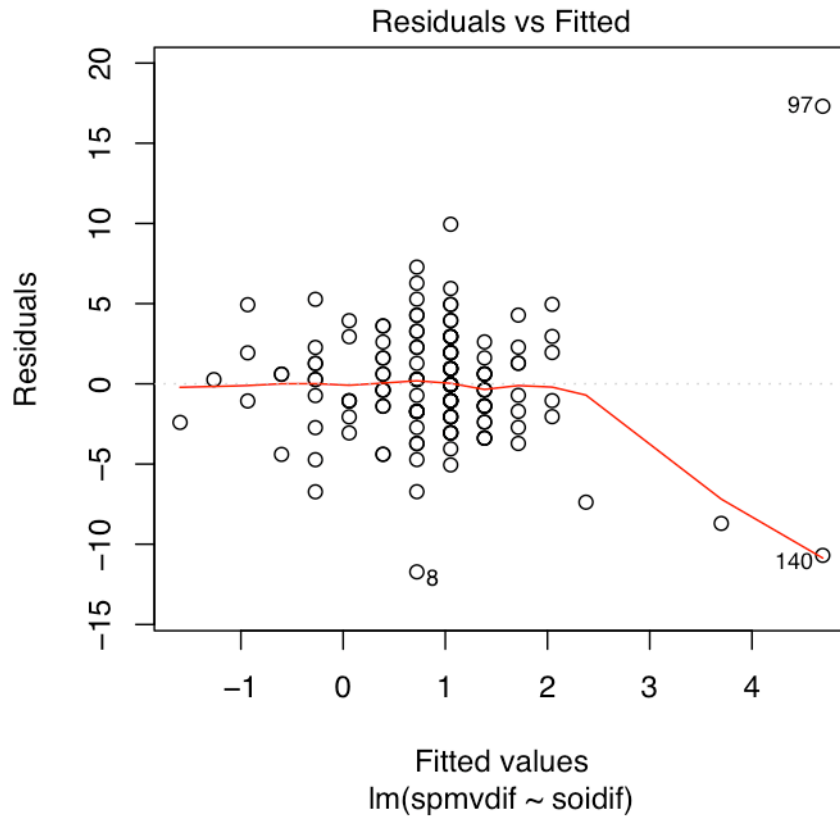
10. Relative to my peer group, I can get dates:

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

With great   With great

Difficulty   Ease

Appendix D

Histograms of RT and mate value difference variables

Appendix E

SPMV change score and SOI attitudes change score

Residuals vs Fitted

Explanation

The x-axis represents SPMV change score obtained by a least-squares regression, and the y-axis

represents the residual value. The red line is a Lowess curve estimating SPMV residuals as a

function of the fitted values of SPMV. The least-squares regression model assumes that residual

values are distributed randomly, with a homogenous variance, around the mean residual value

(0). In this case, both assumptions are violated. Individuals predicted to experience a high SPMV

increase were more variable in their observed SPMV increase. Furthermore, the Lowess curve

indicates that as predicted SPMV increases, residuals are more likely to be observed below their

predicted values. Therefore, while SPMV change increased as predicted with SOI for most values of SOI, more individuals undershot their predicted SPMV values dramatically than overshot them, resulting in the obscure finding that SPMV change varied positively with SOI change, but SOI decreased on average, while SPMV increased on average.