Penultimate draft — Please cite published version.

[Klasios, J. (2014). The evolutionary psychology of human mating: A response to Buller's critique. *Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences*, *47*, 1–11.]

The Evolutionary Psychology of Human Mating: A Response to Buller's Critique

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ABSTRACT

In this paper, I critique arguments made by philosopher David Buller against central evolutionary-psychological explanations of human mating. Specifically, I aim to rebut his criticisms of evolutionary psychology regarding (1) women's long-term mating preferences for high-status men; (2) the evolutionary rationale behind men's provisioning of women; (3) men's mating preferences for young women; (4) women's adaptation for extra-pair sex; (5) the sex-differentiated evolutionary theory of human jealousy; and (6) the notion of mate value. In sum, I aim to demonstrate that Buller's arguments contra evolutionary psychologists are left wanting.

Keywords: evolutionary psychology; mating; David Buller; critique; mate preferences; evolution

1. Introduction

Philosopher David Buller's (2005a) book *Adapting Minds* has been influential in framing much of the discussion of evolutionary psychology in philosophy of biology circles and beyond. Though the first part of Buller's book is oriented as a critique of the theoretical basis of what he dubs (upper-case) "Evolutionary Psychology",[1] the second part proceeds to mount a rather radical critique of paradigmatic work in its larger empirical research program. Unlike some philosophical critics of Evolutionary Psychology (e.g., Richardson, 2007; Fodor, 2000) who find an adaptationist approach to human psychology to be fundamentally problematic, Buller, by contrast, avers that despite his all-out critical attack, he is nonetheless "unabashedly enthusiastic about efforts to apply evolutionary theory to human psychology" (Buller, 2005a, p. x).

With respect to mating in particular, Buller's critique of work by Evolutionary Psychologists is followed by his own alternative explanations. Therefore, the differences between Buller and Evolutionary Psychologists on this front more or less amount to competing hypotheses, and hence can be evaluated accordingly. The focus of the present paper will be to present and then rebut a number of Buller's key criticisms of empirical work in Evolutionary Psychology. My chief aim will be to demonstrate that Buller's alternative explanations are ultimately weaker than the ones on offer in the Evolutionary Psychology research program that he criticizes. The hope is that by broadly rebutting Buller's response to Evolutionary Psychologists' work on mating and highlighting some of the responses to him by others (e.g.,

[1] For the purposes of this paper, I adopt the terminological distinction between (upper-case) "Evolutionary Psychology" and (lower-case) evolutionary psychology. The upper-case nomenclature (Evolutionary Psychology) refers to the overarching research program targeted by Buller.

Delton et al., 2006; Buss & Haselton, 2005), philosophers who originally found his criticisms cogent, and that are not particularly conversant in the relevant empirical literature on mating, may reassess the strength of those criticisms. Two of the general shortcomings of Buller's alternatives appear to be the result of having misrepresented key aspects of the hypotheses he criticizes, and of omitting crucial empirical evidence, in some cases of the sort that speaks against his proffered alternatives. In addition, and in terms of comparative theory assessment more generally, there is also some empirical evidence that has emerged since Buller's book was published that speaks in favor of the prominent views held by Evolutionary Psychologists and against Buller's alternatives.

The structure of the paper is as follows. I aim to rebut Buller's criticisms of Evolutionary Psychology regarding (1) women's long-term mating preferences for high-status men; (2) the evolutionary rationale behind men's provisioning of women; (3) men's mating preferences for young women; (4) women's adaptation for extra-pair sex; (5) the sex-differentiated evolutionary theory of human jealousy; and (6) the notion of mate value. To this end, I critically examine Buller's arguments against (1) and present crucial evidence from within Evolutionary Psychology which contradicts his alternative explanation; marshal evidence that undercuts his criticisms of (2) and instead offer a hybrid view; argue that his arguments against (3) are also belied by available evidence, and, where they purport to advance explanatory addenda, add virtually nothing of explanatory value not already provided by theoretical and empirical work within Evolutionary Psychology; address his criticisms of (4); argue that his account contra (5) misconstrues the focal hypotheses and overlooks relevant evidence bearing on its epistemic status; and finally discuss various considerations that undercut his criticism of (6). In sum, I aim to demonstrate that Buller's arguments contra Evolutionary Psychologists miss the mark.

2. Women's long-term mating preferences for men with high-status

Central to Buller's (2005a, pp. 228–244) argument against the view proffered by Evolutionary Psychologists that women have an evolved preference for high-status men is that the evidence for such a view is illusory. Moreover, Buller alleges that the data presented by Evolutionary Psychologists is instead better explained by the alternative process of homogamy (roughly, individuals with comparable traits mating with one another). Before appraising Buller's argument, however, a clarification on the concept of status is in order. Status, as typically operationalized by Evolutionary Psychologists and others, is comprised of both *dominance* and *socioeconomic status* (SES). For present purposes, I confine my analysis to the socioeconomic component of status (SES), which can roughly be defined as an individual's income and occupational prestige.

In his assessment of a number of empirical studies adduced by Evolutionary Psychologists in support of the view that women prefer long-term mates with high SES, Buller (2005a) contends that:

> given the composition of the subject groups in these experiments, none of the experiments can distinguish whether female respondents were indicating a genuine preference for a mate with high SES or whether their ratings were a product of simple assortative mating by status. (p. 237)

According to Buller, given that the samples of such studies were biased by dint of the fact that they were variously comprised of middle-, upper middle-, and upper-class women, their empirical results can be alternatively interpreted as arising from preferences for homogamy. Though Buller does affirm that there is indeed a sex-difference in the income level that men and women prefer in a long-term partner (as well as in other relationship types), he argues that it obfuscates the real causal process undergirding it, which he contends is assortative mating. Buller also agrees with the assertions of Evolutionary Psychologists such as Kenrick and Keefe (1992) that men and women seemingly have preferences for assortatively mating with respect to certain characteristics, such as "similar expectations, values, activity levels, and habits" (Kenrick & Keefe 1992, p. 85). At the same time, however, he argues that the sex difference in stated preferences for income in a partner is symptomatic of the average income differential between men and women in American society, where most if not all of the studies in question were conducted. In addition, Buller contends that income is a much better predictor of other facets of social status in men than it is in women, given the various disparities in income between the sexes. Thus, according to Buller, in order to accurately use income as a proxy for assortatively mating with respect to social status (as well as other characteristics), women must prefer men with income levels above theirs in order to correct for the above mentioned disparities.

In light of all this, some testable predictions of Buller's alternative hypothesis can be derived. On the one hand, according to Buller's homogamy hypothesis, women of medium SES should be expected to prefer, for example, long-term mates of either equal or greater SES. But crucially, any preference for a long-term mate with higher SES cannot greatly exceed the woman's own SES, as such a preference would defeat the aim of mating in accordance with homogamy. In other words, women of medium SES should find men that, relative to them, are

lower in SES to be unattractive as long-term partners, and by contrast, should find men of SES above them as attractive, but only up to a point. Buller's alternative hypothesis would therefore predict a threshold, such that women of medium SES no longer find men attractive as long-term partners once such men reach an SES level that (adjusted perhaps for income inequality) sufficiently outstrips theirs, and all else being equal. An empirical finding published well in advance of Buller's book, however, falsifies this prediction. In a study comprised of undergraduate students predominantly of medium and upper-medium SES, Kenrick et al. (2001) found that the ratings given by women of a man's desirability as a marriage partner *rose in proportion to his income level*. That is, as a given man's income level increased, so too did his attractiveness as a marriage partner, which should *not* be the case if Buller's alternative hypothesis is correct, the latter of which, again, holds that women prefer to mate assortatively by status. According to the results of Kenrick et al. (2001), a man making $1-million annually was no less attractive as a marriage prospect as one making $200-thousand annually. According to Buller's alternative hypothesis, we should expect that the women in this study, having been drawn mainly from medium and upper-medium SES, should rate men earning in excess of, say, $150-thousand or more annually as less attractive as marriage prospects than men with incomes much closer to the annual incomes of the women involved in the actual study. Yet this was not the case.

There is also a second prediction which can be teased out of Buller's alternative hypothesis, and it too has already been falsified empirically, also well before the publication of his book. According to Buller's homogamy hypothesis, as both men and women move up the SES ladder, both sexes should perceive their pool of acceptable mates diminishing, since the higher one moves up the SES ladder, the smaller the amount of SES-matched potential partners

there generally will be. Contrary to this derived prediction, however, Townsend (1989) found a notable sex-difference when he asked both male and female medical students whether they observed their pool of potential marriage partners diminishing or expanding. In that study, 85% of women reported their pool of suitable marriage partners diminishing as they advanced in their career (which is also consistent with the view that there are lower absolute numbers of individuals at higher levels of SES relative to medium or lower levels). Crucially, however, 90% of men, by contrast, saw their pool of suitable marriage partners *increasing*. These results indicate that men felt that their own career advancement—and with it, higher SES—increased their mate value, and hence yielded a concomitant increase in their pool of potential mates. This asymmetric result between what women subjects stated on the one hand, and what men subjects stated on the other, should not have been the case according to Buller's alternative hypothesis. In sum, these additional empirical findings contradict Buller's alternative hypothesis, but support the view tendered by Evolutionary Psychologists that women possess evolved long-term mating preferences for high-status men.

One additional point here is worth addressing, however. Drawing from the findings of Eagly and Wood (1999), Buller (2005a) also claims that, "The fact that Eagly and Wood found a correlation between degree of economic inequality across societies and the strength of the sex difference in emphasis on *good financial prospect* is thus fully consistent with assortative mating by status" (p. 244). However, this observed correlation between a society's economic inequality and the magnitude of the sex difference for good financial prospect could very well be governed by an underlying facultative, domain-specific psychological adaptation which evolved to contingently respond to specific ecologically-relevant variables in adaptive ways. Such a postulated cognitive underpinning may thus have been shaped not, as Buller supposes, as a

means to effect assortative mating per se, but rather as something shaped by selection to yield behavior conducive to fitness maximization in ancestral conditions. For instance, the underlying psychological adaptation in women might, at least partially, calibrate the strength of the preference for high status men in response to the degree of overall health in the local environment, with lower levels of overall health leading to greater preferences for high status men (who have access to valuable resources conducing to better health). Alternatively, the hypothetical psychological adaptation might instead adjust the absolute strength of women's preference for good financial prospect in a way that is contingent on their own degree of financial independence.[2]

3. The evolutionary rationales of marriage and men's provisioning

Buller's (2005a, pp. 259–277) discussion of long-term mating—particularly marriage—is also problematic. For instance, at one point Buller (2005a) frames the issue this way:

> If the traditional view of the evolution of marriage is right, the ultimate cause of marital motives in both sexes is increased survivability and subsequent reproductive success of offspring. If Evolutionary Psychology is right, these were operative ultimate causes, but *paternity certainty* was also among the ultimate causes of marital motives in men. If the mating effort hypothesis is right, survivability and subsequent reproductive success of offspring is the ultimate cause of marital motives in women, but the ultimate cause of marital motives in men is increased *paternity opportunities*. (p. 271, emphasis added)

[2] See Delton et al. (2006) for other possibilities.

The chief shortcoming of Buller's overall approach, in my view, is its dichotomous construal of the theoretical explanations on offer. This unfortunately leads Buller to erroneously view various hypotheses proffered by Evolutionary Psychologists on the one hand, and evolutionary anthropologists on the other, as being mutually incompatible. On the contrary, a more accurate explanation of human mating patterns turns out to be more nuanced and hybridized than the explanation Buller tenders. Such a nuanced, hybrid view would draw from explanations such as the mating effort hypothesis and the paternity certainty hypothesis, to name two. As an upshot, therefore, the ancestral selection pressures that shaped the mating psychologies of men and women were likely multiple. And at least in principle, it should be possible to disinter the selection pressure(s) that forged each constituent aspect of men's and women's respective mating psychology by examining in detail their design features. And it should be made clear that "Evolutionary Psychologists" accept views put forth by lower-case evolutionary psychologists in the domain of mating. Indeed, prominent frameworks of mating within Evolutionary Psychology integrate views within anthropology (for instance), as well as advance novel extensions to those latter views.

At any rate, there is evidence against Buller's construal of the evolutionary reasons for men's marital motives (namely to facilitate paternity opportunities), and in favor of the hybrid view which sees marriage as facilitating *both* paternity opportunities and paternity certainty. For instance, Marlowe (1999) found that Hadza men's putative biological children received *more* direct investment (roughly, time spent playing with and directly handling children) than did any non-biological children that their partner also had. Among a traditional, rural agricultural culture in Senegal which practices polygyny, Alvergne et al. (2009) found that paternal investment in

children was positively associated with measured similarities of face and odor between the child and the putative father. Furthermore, such children receiving more paternal investment exhibited enhanced growth and nutrition. Apicella and Marlowe (2004) also found that men's perception of their resemblance to putative offspring, and also their perception of their female mates' fidelity, both independently predicted men's reported paternal investment. Similarly, a second questionnaire administered to 170 men by Apicella and Marlowe (2007) replicated these results, once again finding that subjects' perception of mates' fidelity and perceived resemblance to offspring both independently predicted paternal investment.

The above evidence belies Buller's view that men's parenting investment has been shaped by evolution to function—in the ultimate sense—merely as a means of acquiring paternity *opportunities*, rather than paternity *certainty*, from their female partners. For if parenting investment was *merely* a means of acquiring paternity opportunities and not for investing in biological offspring per se, it would not be expected that men would bother to discriminate between a woman's offspring in deciding how to allocate their paternal investment, as the empirical studies cited above find to be the case. That is, in investing in their female partner's offspring, it would be theoretically expected on Buller's view that men would provide no more direct investment in their own putatively shared-offspring with her than in those offspring of hers sired by other men.

Still, according to the data presented by Marlowe (1999), overall direct investment in biological children diminished in proportion to the mating opportunities that men had. That is, men had a tendency to capitalize on any extra-pair mating opportunities that presented themselves. Contrary to Buller's dichotomous framing, then, it appears that men's mating psychology is governed by both mating effort and parenting effort, though the precise expression

of either depends on specific socioecological conditions. Hence, it appears that men's mating psychology has been sculpted by selection pressures for mating effort *and* parenting effort. In spite of all of this, however, in most socioecological contexts it is expected to be in women's fitness interests to monopolize a man's resources, since women do not have the option—as men do—to increase their reproductive output via increased mating effort, and since their children's mortality and health are oftentimes proportional to the nutritional and other resources invested in them.

The data presented by Marlowe (2003) also depicts a facultative adjustment of men's provisioning efforts, contingent on the presence or absence of young offspring. Thus, the pattern that Marlowe (2003) finds amongst Hadza men is, at the very least, consistent with the view that men's hunting and foraging efforts function at least partly as parenting effort, in addition to it putatively functioning as extra-pair mating effort—as per the "show-off"/costly-signaling theory of men's hunting (Hawkes & Bliege Bird, 2002). On the other hand, a man's investment in putatively shared offspring with a woman does not likewise always maximize his own fitness. Rather, mating effort may more effectively increase his fitness, as in those cases where additional mating opportunities may be available. In these ways, the fitness interests of the two sexes come into conflict.

It is these considerations which also incidentally bolster another evolutionarily-derived theory, namely that jealousy is an evolved adaptation (with some important sex-specific differences in that adaptation). In the case of male extra-pair mating effort (that is, mating effort directed to a woman (or women) other than a man's current long-term partner), a female stands to lose reproductively-valuable male investment. Such a loss would come either by way of lost parenting effort invested in the woman and their shared offspring, or through a potential loss of

her partner outright, in the case of mate abandonment. Furthermore, it is by no means a given that simply because a woman is mated to a good hunter that he will therefore reliably provide valuable macronutrients, vital caloric subsidies, and other services—i.e., during the critical period of lactation. Such a possibility looms in light of the view that male hunting of large animal game in hunter-gatherer groups has, perhaps in addition to direct provisioning of pair-bond partners, evolved to function as a costly-signal intended as mating effort (e.g., Hawkes & Bliege Bird, 2002). That is, a good hunter may very well opt to allocate a significant portion of his time and energy into (extra-pair) mating effort, rather than hunt and forage for his partner and their shared offspring. Moreover, women are also vulnerable to such mate defection, given that such men are typically of high mate value, and thus are also candidates for "mate poaching" by other women (Schmitt & Buss, 2001). As such, therefore, it is not unreasonable to hypothesize the existence of a jealousy adaptation in both sexes, but particularly, in this case, in women (see §6). Furthermore, if a compelling case in favor of the existence of an adaptation for jealousy *in men* can be made (see §6), then that would bolster the conclusion that the mating psychology of men has been shaped by selection, at least in part, to facilitate paternity certainty. For jealousy on the part of men would therefore be a solution to the problem of potentially investing in offspring sired by other men, and thereby a means of increasing paternity certainty.

In sum, the considerations discussed in this section support the view that both mating effort and paternity certainty feature as central aspects of men's evolved marital and provisioning motives. Accordingly, Buller's view is at a loss to account for the evidence showing that men preferentially invest in their shared biological offspring with a woman, as opposed to non-shared (and hence unrelated) offspring. Hence, the evidence presented tells against the view of Buller,

which holds that it is exclusively mating effort which defines the evolutionary rationale of men's marital motives.

4. Men's mating preferences for young women

Buller (2005a, pp. 210–226) also believes that the claim of Evolutionary Psychologists that men actually prefer younger women as long-term partners is unsupported by the empirical data. For instance, in the cross-cultural data presented by Buss (1989), a sex-difference in age preferences was found, such that men preferred to mate with women younger than they, and women in turn preferred a man older than themselves. This sex-difference in stated age preference also paralleled the age disparities found in actual marriages across cultures. Evolutionary Psychologists therefore often point to this large study to support the view that men have evolved a preference for younger women who evince cues of residual reproductive value. As an alternative explanation, however, Buller offers what he dubs the *age-adjusted homogamy hypothesis*, which holds that a central mechanism driving human mating is a general inclination toward mating with others who are similarly matched on a variety of attributes, as well as a slight age difference between partners to account for differing maturation-rates between the sexes. When conjoined, Buller argues that these two factors can account for the empirical data gathered by researchers such as Buss (1989).

There is, however, evidence which speaks against Buller's proffered alternative. For one thing, Kenrick et al. (1996) found teenaged males to prefer older women as mates—specifically, those closer to peak fertility—which flies in the face of Buller's alternative explanation. These

males were also cognizant that such women would be unlikely to reciprocate interest. Buller's alternative, by contrast, would seemingly predict that these teenaged males would prefer females younger than themselves, as this would accord with the notion that males and females evolved to mate in a way that offsets their maturational asymmetry, as per the age-adjusted homogamy hypothesis. On the other hand, it appears that the actual empirical pattern is both straightforwardly predicted and explained by the Evolutionary-Psychological account, as that account asserts that males are attracted to fertility, specifically, rather than to a female who is younger than them per se. In this sense, the exception proves the rule: It is *only* during males' teenage years that maximally-fertile females are actually *older* than they are, and only at that age where males, as a group, prefer older females (Delton et al., 2006). Furthermore, it is also unclear why evolution would need to enforce age-adjusted homogamy among human pair-bonds occurring later in life—viz., during the 40s, 50s, and 60s, as it is much less plausible that the sexes are accordingly characterized by an asymmetry in maturity at those ages (see Delton et al., 2006).

Buller also contends that the claims of Evolutionary Psychologists gloss over variability in the empirical data. Accordingly, Buller points to the age disparities between men and women as indicated by various samples of marriage records across cultures, as well as across time, highlighting especially the fact that many older men married women who were near the end of their reproductive lives, or, in some cases, indeed past it. At this point, Buller once again draws on the conceptual distinction between mating effort and parenting effort from within behavioral ecology, as well as the *grandmothering hypothesis* (Hawkes et al., 1998), to explain the variation within the above-mentioned empirical data presented by Evolutionary Psychologists. Accordingly, Buller claims that some men allocate more effort to mating goals and therefore

seek women much younger than themselves—with the largest disparities emerging among much older men, i.e., in their 50s and 60s—while some men allocate more effort to parenting and grandparenting effort.

The deeper deficiency of Buller's proposed alternative to account for variability in the data, however, is that it ignores the larger and extensive body of empirical and theoretical work within Evolutionary Psychology. Specifically, most if not all of what he offers by way of an explanation of variability in men's mating patterns are theoretical points of view also subscribed to by the narrowly-construed group of Evolutionary Psychologists he critiques. Buller's account of short-term mating is, in actuality, formulated in a more precise form by the various prominent theoretical frameworks found elsewhere within the Evolutionary-Psychological literature on mating. Among these theoretical frameworks are sexual strategies theory (Schmitt, 2005) and strategic pluralism theory (Gangestad & Simpson, 2000). Empirical data on, and theoretical explanations of, the short- and long-term mating proclivities of both men and women, as well as their parenting behavior, were prominent aspects of the wider mating literature within Evolutionary Psychology long before Buller's book was published. In sum, therefore, Buller's alternative explanation of the variability in men's mating behavior does not add anything that was not already pre-existent within the literature of Evolutionary Psychology.

I close out this section on men's mating preferences by examining the view in Evolutionary Psychology that men possess a preference for women with a waist-to-hip ratio (WHR) around 0.70. On the basis of some purportedly anomalous empirical results, Buller expresses skepticism that men possess a universal preference for a 0.70 WHR. However, these apparently conflicting results may stem from the use of study designs that use simple two-dimensional line drawings and fail to present women's WHR from multiple angles. Indeed,

recent research by Singh, Dixson, Jessop, Morgan, and Dixson (2010) on WHR preference indicates that such anomalous results disappear when more realistic stimuli are presented to male subjects. Singh et al. (2010) showed male subjects photographs of women from multiple angles, each of whom had undergone surgical procedures that yielded low WHR. This allowed them to also control for potential effects of body mass index on ratings of attractiveness. Singh et al. (2010) found cross-cultural consensus on the most attractive waist-to-hip ratio (WHR) as reported by men across very disparate societies. Specifically, men from rural Cambodia (Bakossiland), Komodo Island in Indonesia, Samoa, and New Zealand all judged women with a lower waist-to-hip ratio to be most attractive, and regardless of body mass index. Singh et al. (2010) also survey the evidence linking female WHR with reproductive age, fertility, and health on the one hand, and with reported attractiveness (by men) on the other, finding it to be supportive of the mainstream view of Evolutionary Psychologists: that men have evolved a preference for low WHR in women because such a mating preference would have been conducive to male fitness ancestrally.

In addition, though Buller cites the study by Wetsman and Marlowe (1999) as evidence that Hadza men have higher WHR preferences, that study only utilized frontal WHR pictures of women. A follow-up study by Marlowe, Apicella, and Reed (2005) (involving American men in addition to Hadza men) utilized pictures of both frontal WHR and profile WHR. This allowed them to present male subjects with photographic depictions of women that accurately matched their *actual* WHR, which was independently recorded by the researchers. Unlike the study by Wetsman and Marlowe (1999), this study measured buttocks as well as hips by recording the total circumference (hence provided a measure of the actual WHR of women). Crucially, the actual WHR preference as reported by both Hadza and American men converged: both groups

preferred low WHR. So the anomalous results of Wetsman and Marlowe (1999) appear to disappear once actual WHR is measured (as opposed to merely profile WHR). Similarly, Buller also cites the study by Tassinary and Hansen (1998) which produced results that conflicted with the view of Evolutionary Psychologists. However, this study utilized line diagrams as the stimuli presented to male subjects. As we have already seen, the more recent and realistic study design of Singh et al. (2010) (which, again, used real pictures of women, showcasing their WHR from multiple angles) found the disparate populations of men to converge on a preference for low WHR. So it appears as if studies using more realistic stimuli present clearer support for the view of Evolutionary Psychologists, whereas the anomalous results cited by Buller can be accounted for by their use of less realistic stimuli. It is also worth noting that a recent study by Karremans, Frankenhuis, and Arons (2010) found that congenitally blind men preferred mannequins with low WHR as opposed to higher WHR (which they were able to assess through tactile contact). Finally, Cashdan (2008) presents an insightful analysis of the ways in which women's WHR, and men's preference for WHR, might adaptively and facultatively calibrate in response to various socioecological variables, hence explain some or all of the individual and population differences. Such a framework is quite concordant with the conclusion of Singh et al. (2010) that men's WHR preference can adaptively fluctuate within the 0.60 to 0.80 range, with a value of 0.70 being quite common cross-culturally.

5. Women's adaptation for extra-pair sex

Another of Buller's critiques against the Evolutionary Psychology of mating is directed at the hypothesis that women possess an adaptation to facilitate extra-pair mating. According to evolutionary psychologists such as Gangestad and Thornhill (2008), women possess the adaptation for the purposes of securing good genes for offspring. Such an adaptation has been postulated to operate under specific conditions, and particularly when a woman's pair-bond partner possesses inferior genetic quality. As well as possessing other features, the adaptation has been characterized by researchers as designed to home in on various traits in men that are reliable indicators of good genetic quality (i.e., prominent jaws, deep voices, facial features indicative of high testosterone levels during development, etc.). According to Thornhill and Gangestad (2008), not all women can secure a long-term mate who also possesses good genetic quality, since in order for a woman to secure such a long-term partner, she will typically need to possess high mate value herself. Indeed, various lines of evidence have been gathered by evolutionary psychologists in support of the hypothesis. Buller (2005a), by contrast, argues that such evidence can be accounted for by a by-product explanation, rather than by the adaptationist one that Evolutionary Psychologists have extended:

> Now, I think that the claim that women have a psychological adaptation for short-term infidelity goes well beyond the evidence. In fact, I will argue that the pattern of female short-term infidelity described above is best explained as a *by-product* of how *other* psychological and physiological adaptations operate under particular circumstances, rather than as a direct result of an adaptation specifically *for* short-term infidelity. Thus, I will *not* be arguing that Evolutionary Psychology is wrong to give a biological explanation of female short-term infidelity, but that it is wrong to give an adaptationist

> explanation of it. The disagreement concerns the *kind of biological explanation* that should be given of female short-term infidelity, and I will argue that a *by-product explanation* provides the simplest account of all the data. (pp. 289–290)

According to the alternative by-product explanation of Buller (2005a, pp. 277–298), he alleges that three main elements can account for the empirical pattern observed: (1) women's 'sex drive'; (2) a peak in sexual desire during the fertile window of the ovulatory cycle, followed by attendant increases in female-initiated sex; and (3) a mating preference in women for symmetrical men in general. Accordingly, Buller argues that the pattern of phenomena documented by investigators like Thornhill and Gangestad can be accounted for as a by-product of these combined elements, each of which evolved for reasons other than, and not directly for, a distinct estrous sexuality which functions as a means of selective sire-choice by women for good genes benefits. In addition, Buller (2005a, pp. 290–296) claims that women's desire for extra-pair copulation partners is mediated specifically by sexual satisfaction, and that women involved in sexually unsatisfying long-term relationships will be especially prone to seek extra-pair sex. One can diagnose a set of problems with Buller's alternative, however, and in particular as it fares in direct comparison with the rival adaptationist hypothesis of Thornhill and Gangestad.

Firstly, although Buller purports that women's sexual desire is heightened mid-cycle around the fertile period, the empirical evidence for such heightening in female sexual desire mid-cycle is quite mixed (e.g., Thornhill & Gangestad, 2008, pp. 243–244). Secondly, Buller claims that sexual desire evolved to be at a peak when women are in their fertile window, by dint of the fact that such sexual desire evolved for 'reproduction'. Although this claim sounds relatively innocuous, Thornhill and Gangestad (2008) present a number of empirical and

theoretical reasons why the phylogenetically-widespread function of estrus is not merely for acquiring sperm per se. Briefly, there does not appear to have been widespread selection pressure on females in general for securing sperm, since in most cases there is a contrasting selection pressure on males to inseminate females. Ergo, so the reasoning goes, it should not be theoretically expected that females in all species should evolve to pay the costs associated with actively securing sperm, and this is especially true in human females. Thirdly, Buller's hypothesis is seemingly unable to explain why, for example—and to take just one piece of the documented empirical pattern—women find more feminine faces attractive in the non-fertile luteal phase of menstrual cycle, but more masculine faces attractive in the fertile follicular phase of the menstrual cycle. By contrast, Thornhill and Gangestad's adaptationist hypothesis does not assert that only one constellation of traits is sexually attractive whereas the other is not. Rather, their hypothesis specifically predicts that a certain constellation of traits will become more sexually attractive to women during the fertile estrous phase—namely those traits that are, or at least were ancestrally, reliable indicators of good genes—whereas traits associated with better parenting qualities (i.e., more feminized traits) will be more sexually attractive to women during the infertile luteal phase.[3] So far as men's faces and women's preferences for them are

[3] Masculine bodily and behavioral traits indicative of high testosterone, such as pronounced brow ridges, large jaws, and social dominance, are found by Evolutionary Psychologists to be indicative in various ways of increased mating effort and increased risk taking (Thornhill & Gangestad, 2008, pp. 174–177; Gangestad & Simpson, 2000). Moreover, various researchers have found that individuals, particularly women, accurately attribute increased mating effort and propensity for risk taking to men in possession of such traits (see Penton-Voak & Perrett, 2001). For instance, Kruger (2006) found that women attributed promiscuous attitudes (i.e., less likelihood of remaining faithful) and poorer parenting qualities to masculine faces. Penton-Voak and Perrett (2001) review literature that demonstrates an association between feminine faces and more self-reported pro-social traits (i.e., honest, less

concerned, Thornhill and Gangestad's (2008) hypothesis can directly explain why the face women prefer near ovulation is different, namely more masculine, than the one they prefer when infertile, namely more feminine. Buller's alternative hypothesis is apparently at a loss to explain all of these specific shifts in sexual preferences.

Fourthly, the fertile-phase preference for masculine facial traits appears not to be a by-product of a generalized difference in facial perception either. For instance, Johnston et al. (2001) did not find a difference in women's fertile-phase judgments of other women's facial attractiveness, or other facial attributes among men or women. Rather—and in line with the findings of other studies—the effect seems to be specific to a preference for men's facial masculinity, and only when evaluating men for 'sexiness'. Fifthly, Buller's proposal suggests that the preferences women have for the specific features they find sexually attractive in general will be especially heightened mid-cycle while fertile. Yet, as the documented empirical phenomena makes evident (see Thornhill & Gangestad, 2008), it is simply not the case that women's sexuality is characterized by 'general' sexual preferences. Instead, there are two distinct sets of preferences which manifest, ceteris paribus, in accordance with the phase of the ovulatory cycle a woman happens to be in. Indeed, this is why Thornhill and Gangestad gave

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dominant). On the other hand, testosterone and traits indicative of testosterone are associated with dominance behaviors (Mazur & Booth, 1998). Perhaps more importantly, relative to men with testosterone levels one standard deviation below average, men with testosterone levels recorded at one standard deviation above average in a large sample of U.S. armed forces members stood a much greater chance of remaining unmarried; experiencing troubled marriages; inflicting domestic violence; and engaging in extra-marital sex (Booth & Dabbs, 1993). Perhaps as an upshot, then, even if men with more feminine traits are not intrinsically better mates and parents per se, it seems plausible, ceteris paribus, that they would make for more monogamous and higher investing mates relative to masculine men.

their hypothesis the name ‘dual sexuality’—to denote its two-sided nature. Sixthly, and finally, Buller purports that sexual satisfaction, specifically, mediates women’s desire for extra-pair sex—that is, sex with men other than their long-term partner. However, analyses of data collected by Gangestad et al. (2005) reveal that even controlling for sexual satisfaction (as well as relationship satisfaction) does not reduce the size of the effect of partner asymmetry on women’s sexual preferences and desires for extra-pair partners with traits indicative of good genes. Empirically, measuring a composite of men’s traits (i.e., ears, wrists, ankles, etc.) for their overall degree of bilateral symmetry shows a positive correlation with traits taken to be indicators of good genes, and which are reported by women to be attractive.[4] Hence, it is not symmetry *per se* which researchers generally take women to be assessing. Rather, the overall degree of bilateral symmetry in traits—measured as an overall composite—is recorded for the benefit of researchers, as such symmetry is positively correlated with traits indicative of good genes.

Contra Buller, it is the lack of traits indicative of good genes in their pair-bond partners—as measured by researchers via men’s degree of overall body asymmetry—and not sexual or relationship satisfaction, that appears to be mediating women’s fertile-phase preferences and desires for extra-pair men in possession of good genes. According to Buller’s hypothesis, and as already mentioned, sexual satisfaction should mediate women’s desire for extra-pair sex, yet it appears not to have this mediating effect. An additional study by Haselton and Gangestad (2006) also found that women reporting their long-term partners as less sexually attractive were more likely to be attracted to and flirt with other men during their fertile window, and once again even when controlling for a measure of sexual satisfaction within their long-term relationship. The upshot, therefore, is that Buller’s alternative by-product hypothesis appears to be unable to

[4] For an overview of these and related issues, see Thornhill and Gangestad (2008, pp. 162–181).

account for a number of critical findings, whereas Thornhill and Gangestad's adaptationist hypothesis straightforwardly can do so.

6. The sex-differentiated evolutionary theory of jealousy

Buller (2005a, pp. 301–338) also alleges that the sex-differentiated evolutionary hypothesis of jealousy is unsupported by the actual data that has been presented in its support. Moreover, he advances an alternative in its place, namely what he dubs *the relationship jeopardy hypothesis.* On the one hand, Buller's alternative hypothesis essentially contends that human jealousy has evolved to safeguard mating relationships from being poached by rivals. Further, Buller additionally argues that such an alternative can even account for evidence that men, for instance, can sometimes experience jealousy outside of a strictly committed relationship, and even in rarer cases where they have not been sexually intimate with a particular woman. On this last point, Buller suggests that his alternative can account for such findings because jealousy, according to that hypothesis, also evolved to guard against paternity competition from other males, as well as sunk costs in the form of time spent courting a female, including resources expended on them, inter alia. A key difference of Buller's alternative hypothesis vis-à-vis the sex-differentiated evolutionary hypothesis, however, is that it does not posit any innate sex differences in the underlying psychological mechanisms governing human jealousy. In any case, the threats to valued mating relationships that Buller identifies as being explicable by his alternative hypothesis are also subsumed by the sex-differentiated evolutionary account. For after all, the

account that Buller criticizes also hypothesizes that jealousy in *both* sexes is "designed to alert an individual to threats to a valued relationship" (Buss & Haselton, 2005, p. 506).

As will be shown, however, there are serious problems with Buller's analysis of the sex-differentiated evolutionary theory of jealousy. In depicting the sex-differentiated evolutionary theory, Buller (2005a, pp. 301–338, 2005b) claims that the theory entails that men are affected more by sexual infidelity than they are by emotional infidelity, whereas women are affected more by emotional infidelity than by sexual infidelity. Given this formulation, Buller (2005b) asserts:

> To confirm the hypothesis, it is necessary to confirm these primary entailments – to confirm, for example, that males care more about sexual infidelity than they do about emotional infidelity, not simply that they care more about sexual infidelity than females do. (p. 4)

Buss and Haselton (2005), however, retort that this formulation in fact badly misrepresents the focal hypotheses and the predictions therein. As they note, early theoretical and empirical work with respect to these particular hypotheses carefully stated that the focal predictions were in terms of "*sex differences in sensitivities* to different forms of infidelities" (Buss & Haselton, 2005, p. 507), and not, as Buller purports, in terms of the *absolute levels* of those different forms of infidelities for each particular sex. Buss and Haselton (2005) also note that the absolute levels of jealousy experienced by each sex for either particular form of infidelity "are affected by many factors external to the hypothesis" (p. 507). Hence, the absolute levels of each form of jealousy in each of the respective sexes do not bear centrally on the focal hypotheses and predictions of

the properly framed sex-differentiated evolutionary theory. Incidentally, the empirical evidence with respect to jealousy and other associated phenomena in homosexuals which Buller argues counts against the sex-differentiated hypotheses could very well be accounted for by such external factors. At any rate, when formulated in the way that Buss and Haselton (2005) allege the hypotheses were originally intended, the cross-cultural evidence marshaled by Buller (2005a, pp. 301–338, 2005b) in remonstration turn out to *support* rather than contradict them.

However, in his rejoinder to these points, Buller (2005c, p. 509) claims that the focal predictions have been inconsistently made within the literature. Yet, although Buller may plausibly argue that the focal predictions have been inconsistently worded within the literature, it cannot be argued that the predictions of the hypotheses as alleged by Buss and Haselton have never appeared in the primary literature. For instance, Buss et al. (1992) stated that "Both sexes are hypothesized to be distressed over both sexual and emotional infidelity", and crucially, that "these two kinds of infidelity should be *weighted differently* by men and women" (p. 251, emphasis added). And though Buller (2005c, p. 509) points to the statement by Buss et al. (1999) that "A man's jealousy has been hypothesized to focus on cues to sexual infidelity because a long-term partner's sexual infidelity jeopardizes his certainty in paternity" (p. 125), as a formulation that supports his construal of the prediction made by the hypothesis, Buss et al. (1999) also state in the very same paragraph that "Both sexes, of course, are distressed by both forms of infidelity, and *the evolutionary hypothesis suggests that they should be*, given their *correlated nature* in everyday life", and that "The hypothesis, rather, is about *sex differences in the emotional weighting of the aspects of infidelity*" (pp. 125–126, emphasis added). It is puzzling why Buller (2005c) discounted this additional statement, given that it appeared in conjunction with (and in the same paragraph of) the statement he takes to be an unambiguous

presentation of the sex-differentiated hypothesis. Hence, the charge made by Buller (2005c) that Buss and Haselton are "retrofitting their predictions to the data" (p. 509) is an overstatement.

Another serious shortcoming of Buller's overall critique of the sex-differentiated evolutionary explanation of jealousy is his failure to examine all of the relevant evidence in its support. To wit, Buller's critique only assesses 2 of at least 13 postulated sex-differentiated design features of jealousy. Indeed, it can be argued that any overarching theory can only be adequately appraised by examining how it fares with respect to all of the relevant evidence available. Aside from the two sex-differentiated design features discussed above—namely men being more sensitive to cues of sexual infidelity than women are, and women being more sensitive to cues of emotional infidelity than men are—11 other postulated sex-differentiated design features are highlighted by Buss and Haselton (2005).[5] All of these additional hypothesized sex-differentiated design features have received empirical corroboration. Specifically, (1) women are especially distressed by contexts in which relationships are threatened by physically attractive rival women (Buss et al., 2000); (2) men are especially distressed by contexts in which relationships are threatened by rival men in possession of relatively greater amounts of resources (Buss et al., 2000); (3) men exert increased levels of jealous mate-guarding if pair-bonded to physically attractive women (Buss & Shackelford, 1997); (4) women exert increased levels of jealous mate-guarding if pair-bonded to men in possession of high amounts of resources (as such men are targeted more frequently by rival women) (Buss & Shackelford, 1997); (5) men experience enhanced cognitive processing of cues

[5] Maner and Shackelford (2008) also discuss methodological issues with respect to testing the sex-differentiated evolutionary account, as well as highlighting additional empirical evidence of other apparent design features. They note also the importance of investigating the proximal cognitive underpinning of jealousy and the manner in which it supposedly issues in manifest behavioral output.

to sexual infidelity (relative to women) (Schützwohl & Koch, 2004); (6) men possess greater memory retrieval of cues to sexual infidelity than women do (Schützwohl & Koch, 2004); (7) women experience enhanced cognitive processing of cues to emotional infidelity (relative to men) (Schützwohl & Koch, 2004); (8) women possess greater memory retrieval of cues to emotional infidelity than men do (Schützwohl & Koch, 2004); (9) in response to cases of actual infidelity, men are less likely than women to forgive a sexual infidelity than an emotional infidelity (Shackelford et al., 2002); (10) men also are more likely than women to dissolve a relationship when confirming a partner's sexual infidelity than they are when confirming a partner's emotional infidelity (Shackelford et al., 2002); and finally, (11) men increase their jealous mate-guarding when their partners are in the fertile phase of the menstrual cycle just prior to ovulation, precisely the critical window where a man's paternity certainty is at risk via cuckoldry from a male interloper (Gangestad et al., 2002).

With respect to this last design feature, for instance, a large overarching research program has been conducted by a number of evolutionary psychologists examining the existence of shifting mate preferences in women (as discussed in §5), resulting in various lines of supporting evidence. Specifically, accumulating evidence of various design features has been taken to support the existence of a sexually-selected psychological adaptation in women postulated to function in the service of achieving dual goals: acquiring material provisioning and other services for offspring on the one hand, as well as acquiring good genes for offspring on the other hand (Gangestad & Thornhill, 2008). Moreover, that the interests of men and women appear to be at cross-purposes in this manner is not merely idiosyncratic to humans. Rather, it would be but a single species-specific manifestation of the pervasive occurrence of conflict between the sexes amongst many animal species. It is in light of these conflicts of interest between the sexes

that evolutionary biologists have documented the existence of various adaptations and counter-adaptations—and perpetual iterations of counter-adaptations to counter-adaptations—in numerous species, all an outcome of sexually-antagonistic co-evolution. As such, it should come as no particular surprise if humans have likewise been subject to the same co-evolutionary process, and specifically, in this instance, as it relates to an adaptation for jealousy.

Of relevance here, the discussion by Thornhill and Gangestad (2008, Ch. 12) of sexually-antagonistic co-evolution as directly applied to human mating includes a review of empirical data bearing on the extra-pair paternity (cuckoldry) rates in humans and other pair-bonding animals. Evidence for such an adaptation in women lends credence to the overall evolutionary theory of sex-differentiated jealousy, in that if women, for example, possess a psychological adaption which—albeit in a highly contingent and flexible manner—is designed to acquire good genes for offspring from an extra-pair partner whenever their primary pair-bond partner lacks such genetic quality, it would stand to reason that men would evolve a jealousy adaptation especially sensitive to cues of a partner's sexual infidelity. In this regard, the sex-differentiated evolutionary theory's explanation of male jealousy *in particular*, and the theory of women's shifting mate preferences for good providers and good genes indicators, can be seen as mutually-supportive in that each could be theoretically expected given the existence of the other. Furthermore, it is interesting to note again that one of the sex-specific differences in jealousy is the higher sensitivity of men to cues of sexual infidelity on the part of their partner—that is, instances where it is either obvious or even merely suspected that their female partner has become sexually involved with another man. Once again, the postulated design features of men's jealousy in particular—all of which, as we have seen, have received empirical support—are

precisely what one might predict if women did indeed possess an adaptation to contingently cuckold a mate under certain circumstances.

Finally, it should be noted that a recent large meta-analytic examination of the jealousy literature by Sagarin et al. (2012) found significant support for the sex-differentiated evolutionary theory. Among the theory-supportive findings of the meta-analysis of Sagarin et al., sex-differences were found in study designs asking subjects about hypothetical infidelities, and also in study designs that asked subjects about real infidelities that they had experienced at some point in the past. That the meta-analysis found these disparate methods to converge on the same conclusions is especially noteworthy, as it increases epistemic confidence in the overall theory.[6] In sum, Buller's criticism of the sex-differentiated evolutionary theory of jealousy falls short on account of misrepresenting its hypotheses. And just as crucially, Buller's evaluation of the sex-differentiated evolutionary theory fails to assess it in light of all the relevant evidence of other postulated design features (at least those for which existing evidence was available prior to the publication of Buller's book).

7. Considerations regarding mate value

Buller also argues against Evolutionary Psychologists' contention that individual men and women who differ in terms of their respective mate values will also differ in terms of their reproductive success. He argues instead that individuals of differing mate value can nonetheless

[6] Just as importantly, the meta-analysis by Sagarin et al. (2012) addresses methodological issues that have been raised by various investigators in the literature.

achieve reproductive outcomes that are more or less equivalent. At one point, Buller (2005a) frames the issue this way:

> One doesn't necessarily compromise one's reproductive success by "compromising" one's desires for a mate of maximal mate value. There is nothing about modern environments, however, that should make this fact an evolutionary novelty, an unprecedented quirk of our modern age. Our ancestors who were sixes should have had available the option of "compromising" their desires for tens and mating with fellow sixes, yet nonetheless producing just as many offspring as they could have produced by mating with nines or tens. But, if this is the case, there could not have been strong selection for a *desire* for tens in the first place. For selection could not have distinguished between sixes who desired—*whether requited or not*—to mate with tens and sixes who simply desired and mated with other sixes. In other words, desires for members of the opposite sex over a range of "mate values" would have had equal fitness. Thus, selection would not have favored and driven to fixation a desire for mates of the highest "mate value." (p. 254)

However, it will be argued that the notion that 'sixes' possessed reproductive fitness that was on par with 'tens'—at least ancestrally—is not as clear cut as Buller alleges. In this section, I will briefly marshal some considerations that speak against such a view.

To begin with, there is evidence that men's hunting ability covaries with status in small-scale groups (e.g., Bliege Bird et al., 2001). This effectively permits women's preference for high status men to serve as a reliable proxy for whether a man has access to reproductively-

valuable resources. According to the analysis of Marlowe (2001), the specific reproductive benefit that women accrue via male provisioning, namely increased fecundity, is at least partly mediated by shortened birth-intervals. Women apparently are able to translate the caloric surplus provided by male partners into greater fecundity, and this would be at least in part facilitated by the proportional shortening of birth intervals. The presence of a high-investing male can therefore meet the relevant energetic demands of a female and act to shorten her birth intervals.[7][8][9] Accordingly, such male provisioning of mates and offspring among hunter-gatherers

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[7] See Dufour and Sauther (2002) for an analysis of the energetics of pregnancy and lactation as it pertains to humans. Of tangential note, comparative work by Ember and Ember (1979) suggests that the need for mothers to meet their own energetic requirements conflicts with the parenting demands of offspring. Hence, the evolution of bi-parental care among mammals and birds seemingly allows females to circumvent this conflict by receiving provisioning from males.

[8] Incidentally, one prediction that falls out from all this is that female fecundity should be greater in societies where the relative contribution by men to overall subsistence is large. And indeed, the cross-cultural data analyzed by Marlowe (2001) bears out this prediction.

[9] Quinlan and Quinlan (2008) also report data from the standard cross-cultural sample demonstrating that pair-bond stability (a proxy for low marriage dissolution) covaries with an older age at weaning for infants. Women with male partners, relative to those without one, also weaned infants at older ages in a rural village on the island of Dominica (Quinlan et al., 2003). Apparently, the caloric and other material subsidies provided by husbands allowed the women to invest greater amounts in the nursing of their infants, in addition to the shortening of a woman's birth interval that increased provisioning facilitates, and is thus concordant with the analyses of Marlowe (2001, 2003). Male provisioning, therefore, in addition to shortening a woman's birth interval, can also be seen as decreasing offspring mortality rates by providing an insurance against infant starvation. For instance, it may be that when calorie surpluses reach certain levels, women can adaptively allocate those calories such that they decrease their birth intervals and or wean infants later, so as to guard against infant starvation.

supports the view of Evolutionary Psychologists, namely that selecting high-status men with good resource-provisioning abilities can pay off quite directly for women.

However, in examining evidence of the benefits accorded to hunter-gatherer women by high-status mates, some careful consideration must be given to the ubiquitous existence of food sharing among extant hunter-gatherers (Hawkes & Bliege Bird, 2002). With respect to this crucial point, Marlowe (2003) notes that approximately 30% of the calories generated by men derive from honey, a non-animal resource for which group-wide sharing is not significantly expected (as in the case of big game). This makes it much easier for men to directly invest such calories in their mate and offspring. Importantly, Marlowe also reports that good hunters tend to gather more honey and other foods vis-à-vis other men. Because women can therefore reap reproductive benefits from non-animal food sources, mating with high status men who are adept at acquiring such resources can allow women to secure such benefits. And this is so even in the face of widespread sharing of hunted animal game in hunter-gatherer societies. And it is particularly the caloric subsidies derived from both animal and non-animal sources (such as honey) which are supplied by men during critical windows that women stand to gain fitness advantages from.

However, in spite of hunting as a costly-signaling tactic and group-wide food sharing of hunted animal game, it is important not to lose sight of the direct benefits from animal meat that women can nonetheless gain by mating with high-status men who are good hunters. Indeed, Gurven and Hill (2009) persuasively argue that much of the animal meat in small-scale societies is distributed across groups in ways that are less than completely equitable. According to their examination of the literature, much of the distribution pattern is skewed by factors such as favoritism to immediate and extended kin, trade partners, and so forth. In their view, the overall

anthropological literature on men's hunting does not support the costly signaling view as the *exclusive* evolutionary rationale for men's hunting. Rather, they suggest a blended view which incorporates costly signaling and direct provisioning, inter alia.[10] And as Gurven and Hill (2009) note, if high-status men were no more attractive than lower-status men as long-term pair-bond partners, women in traditional small-scale societies would not exhibit the interest that they do in marrying such men.

Even in addition to direct, non-shared subsidies of meat and non-animal food sources, women married to high-status men may be deriving other fitness benefits by virtue of other possible socially-mediated benefits that accrue via those men—i.e., through deference from others, alloparenting, favors, trade, and insurance from future food shortfalls or sickness and injury. Indeed, von Rueden et al. (2011) found empirical support for fitness benefits derived from these latter pathways by high-status men among the Tsimané forager-horticulturalists of Bolivia. With respect to the prestige component of high-status—which roughly tracks resource-provisioning capacity and social prestige—von Rueden et al. (2011) found that prestigious men had higher fertility; offspring that experienced lower childhood mortality; more extra-marital affairs; a higher likelihood of remarrying; earlier ages at first marriage; wives with an earlier age at first birth; more intra-village kin, labor partners, and allies (though not more food-sharing partners); and were accorded more deference and respect, and hence were more likely to have disputes settled in their favor. In addition to these above benefits, if good hunters also possess good genes, it would also effectively permit women to assess male genetic quality by tracking

[10] In general, men's hunting appears to be multifaceted, motivated in accordance with highly-contextual contingencies, and therefore bearing the fingerprints of having been shaped by heterogeneous selection pressures across evolutionary time.

the hunting ability of individual men, or perhaps more specifically, by tracking the big game kills of each man. Theoretically, then, a man's degree of genotypic quality may overlap to a certain extent with his degree of status (via, at least partially, his hunting ability).[11]

Another, albeit indirect, source of evidence in support of the existence of different levels of mate value among men is data shedding light on the selection strengths for male wealth across time and in various types of societies. To this end, Nettle and Pollet (2008) show positive selection on male wealth in all of the heterogeneous samples gathered, even when controlling for a number of obvious and not so obvious confounds. Nettle and Pollet also compare the selection gradients for male wealth vis-à-vis all other selection gradients ever measured by biologists and show that the selection strength for male wealth in contemporary industrial societies falls in the middle of the entire distribution, while the selection strength for historical Europe falls above the middle. Strikingly, the selection strength for male wealth in African agrarian and pastoral societies, both of which exhibit varying degrees of polygyny, ranks in the top 10% of all selection gradients ever measured in evolutionary biology. More relevant for our purposes, however, is the fact that *positive selection for male hunting ability* was also found among the extant small-scale hunter-gatherer groups analyzed, namely the Ache, Hadza, and Tsimané, utilizing a variety of metrics for assessing hunting ability. Indeed, using the latter extant hunter-gatherer groups as a reasonable approximation of ancestral lifestyles, the data support the view that hunting ability—and thus the component of a man's mate value constituted by his hunting

[11] For overviews of these possibilities and others, see Smith (2005) and Gurven and von Rueden (2006)

ability—was quite an important reproductive variable over the course of human evolution in general.[12]

With respect to women's mate value, it stands to reason that a man selecting a young woman as a long-term mating partner will gain fitness benefits from her residual reproductive value, where residual reproductive value refers to a woman's remaining number of reproductive years. As such, the residual reproductive value of younger women is greater than that of older women. Thornhill and Gangestad (2008, pp. 110–143) provide a useful overview of the theoretical and empirical literature on women's residual reproductive value. The primary physical cues that men have evolved to attend to in women are purported to be those that show sensitivity to underlying estrogen levels. And estrogen, in turn, is thought to function as a reliable indicator that signals a woman's reproductive quality and condition, by dint of facilitating the allocation of energetic resources to reproduction-related traits which might otherwise be allocated to other domains—i.e., immune system functioning. Estrogen is postulated to serve as an underlying chemical messenger that mediates the co-ordination of distributed physiological systems that function in the service of reproductive effort. As per life-history theory (e.g., Kaplan & Gangestad, 2005), it is therefore postulated that women possessing better overall quality and condition will be able to allocate, via the mediating effect of estrogen, more energetic resources to the growth and maintenance of the physical traits most valued by men—traits that reliably signal residual reproductive value. In addition, it is possible that some

[12] This is in line with a broader result uncovered by Kingslover et al. (2001), in which their impressive meta-analysis of selection gradients measured in the evolutionary biology literature found mating- and reproduction-related traits to exhibit the strongest selection gradients overall. That more general finding corroborates the central importance of sexual selection in nature.

of the variance in women's overall quality and condition, and therefore their sexual ornaments, is explicable also by individual variation in genetic quality.

Women's sexual ornaments are thought to have evolved via sexual selection because such ornaments initially, at some earlier point in human evolution, were in fact reliable indicators of women's residual reproductive value. Such ornaments are thought to have then been elaborated over time by sexual selection. Because men came to both attend to these particular ornaments and put a premium on them when selecting long-term mating partners, women responded in turn by evolving more elaborate forms of them. Therefore, women who signaled their higher residual reproductive value (and hence higher mate value) in ways superior to rivals came to secure as long-term mates those men capable of investing the most in their offspring (who themselves were higher in mate value). Specifically, key examples of estrogenized sexual ornaments in women are breasts, waist-to-hip ratio, gynoid fat depots, certain facial features, skin, and voice. Once again, a key point is that estrogen is thought to be a reliable signal of residual reproductive value, and so therefore cannot be faked by women of inferior quality and condition. In their discussion of women's permanent ornaments, Thornhill and Gangestad (2008) also note that each sexually-selected ornament in women—that is, each estrogenized trait posited to serve as a reliable signal of residual reproductive value—positively covaries with the others. Such overlap in trait quality is what one would theoretically expect to be the case if such sexually-selected traits were indeed tapping underlying quality and condition in women. In addition, estrogenized traits are maximally attractive at the onset of women's reproductive life and degrade with both age and parity.

As the foregoing considerations show, therefore, it is hasty to think, as Buller (2005a, pp. 252–257) does, that all individual men and women possess equivalent degrees of reproductive

capacity—at least as would be the case under ancestral conditions. For such considerations indicate how reproductively-valued traits can affect reproductive outcomes. Specifically, in extant small-scale societies, women gain reproductive advantages by mating with men who can confer the various benefits that are associated with high status, and men, in turn, can gain reproductive advantages by mating with women evincing youth-associated traits linked to greater residual reproductive value.

8. Conclusion

In light of the foregoing, I conclude that Buller's arguments against Evolutionary Psychologists' work on mating miss the mark. Though the reply offered in this paper is limited to only the mating domain, the hope is that it might also stimulate further discussion with respect to other theories within Evolutionary Psychology, and which attempt to evaluate competing explanations in comparative terms—or perhaps more specifically in terms of inference to the best explanation (Lipton, 2008; Haig & Durrant, 2002; Durrant & Haig, 2001; Psillos, 2002; Thagard, 1978). Buller has provided a very worthwhile counter-perspective to Evolutionary Psychology in general, and, for our purposes, the Evolutionary Psychology of mating in particular. His contribution has generated fruitful discussion and debate. For all this, Buller is to be commended. Having said this, the present paper has only aimed at assessing one component of Buller's larger offensive. And of course, the status of any particular empirical area of Evolutionary Psychology must be arbitrated on a case-by-case basis. Hence, even if the overall picture presented in this critical paper is accepted, it obviously does not necessarily vindicate any

other particular domain of inquiry in Evolutionary Psychology. Rather, the rebuttal presented here might also serve to help drive home the point that any local critique of Evolutionary Psychology is only as likely to succeed in proportion to its consideration of all relevant empirical evidence, and how accurately it represents its target.

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