typed psychological dispositions that correspond to these observed differences. As Erlich and Feldman (2003) argued, "[the researcher] is simply confusing the preferences of women he knows in his society with evolutionary fitness" (p. 89).

Schmitt's analysis of cultural conditions that affect mating strategies also gives priority to evolved psychological dispositions over more plausible accounts (sect. 7.5). To explain the cross-cultural variability, he invokes the concept of contingent evolved dispositions, whereby people contingently shift their mating strategies in adaptive ways depending on the demanding nature of the local environment. Specifically, following Gangestad and Simpson's (2000) arguments, Schmitt argues that environmental stress shifts mating strategies toward larger sociosexuality sex differences because it is primarily women who become more sexually restricted when there is a greater need for biparental care.

Schmitt's data provide limited support for this hypothesis about sex differences in response to environmental demands. His statement that "sex differences in sociosexuality were related as predicted to several indicators of environmental demand" is not supported by even one significant correlation between an indicator of environmental demand and the size of the sex difference (Table 10 of target article). Only when men's and women's sociosexuality scores were separately correlated with indicators of demanding environments did two of these five indicators show that the association between sociosexuality and demand was stronger in men than women (Table 10 of target article). Moreover, when Schmitt placed prevalence of low birth weight, an environmental variable consistent with strategic pluralism theory, in head-to-head competition with women's parliamentary representation, an environmental variable consistent with social structural theory, only parliamentary representation was significant (sect. 6.7.2). Because parliamentary representation is a particularly indirect indicator of women's status, we recalculated the regression model and replaced this predictor with the Gender Empowerment Measure, a more adequate indicator of women's status (Eagly & Wood 1999). Then the findings even more strongly favored our social structural theory over strategic pluralism theory. Our theory thus correctly predicts that sex differences in sociosexuality become smaller with increasing gender equality (Eagly & Wood 1999). However, given the universality of patriarchy within Schmitt's sample, our theory does *not* predict that these differences might be absent within any of these societies, even though Schmitt maintains that our theory has this implication (sect. 4.2).

In interpreting sex differences in sociosexuality, Schmitt gives considerable credence to Baumeister's (2000) claim that women's sexuality is more responsive than men's to environmental and cultural influences (sect. 4.1 and 6.7.2). At best, however, this claim received only mixed support. Although Tables 9 and 10 of the target article reveal that sociosexuality more closely tracked some of the indicators of societal equality and environmental demands among women than men, the data in Table 6 of the target article reveal that sociosexuality is more variable in men than women. Men's mean sociosexuality scores ranged from 28.42 to 65.58 across the nations, a difference of 37.16, whereas women's scores ranged from 11.80 to 41.68, a difference of 29.88. Even more striking is the greater variability of men's than women's scores within every nation except for Latvia. These data are problematic for Baumeister's (2000) assertions that female sexuality is more responsive to external influences than male sexuality (see also Archer & Mehdikhani 2003).

Schmitt also argues that mating strategies contingently shift in adaptive patterns depending on sex ratios. In his view, greater promiscuity in nations with lower sex ratios (i.e., more marriageable women than men) supports Pedersen's (1991) sexual selection explanation by which cultures with more women than men possess mating systems driven by men's evolved desires for promiscuous sex. However, these effects are equally compatible with Guttentag and Secord's (1983) sex ratio theory, which assumes social psychological mediating processes. Specifically, in Guttentag and Secord's economic model of mating, sex ratios affect the values of the social exchanges between men and women in relationships. The minority sex has greater exchange power within relationship dyads because they have more relationship alternatives, higher expectations for outcomes, and less willingness to commit than the majority sex. However, these effects of sex ratios occur within the broader context of men's greater structural power in patriarchal societies. Thus, when women are scarce, men's lesser dyadic power is offset by societal mechanisms that control women's alternatives through social norms that favor monogamy, limit women's interactions with men, and shape female roles in domestic directions. When men are scarce, no such protective mechanisms arise to offset women's relatively low dyadic power. Men then reap the benefits of their greater exchange power by participating in multiple relationships. In Guttentag and Secord's theory, it is because sexual norms benefit those in power that in patriarchal cultures a surplus of men produces greater restriction of sociosexuality than a surplus of women.

Given that patriarchy and sexual control of women are not necessarily organizing features of foraging societies, it is likely that sex ratios would have very different effects from those Schmitt reports if his sample had encompassed more egalitarian foraging groups. However, before scientists accept any one mediating processes as accounting for the relation between sex ratios and mating patterns, critical tests are required of the relative merits of the socioeconomic mechanisms proposed by Guttentag and Second (1983) and the evolved psychological dispositions proposed by Pedersen (1991).

In general, in thinking about how to conduct evolutionarily informed psychological research, we are impressed by Frans de Waal's (2002) statement that "one cannot single out a trait for an adaptive story, as is often done in evolutionary psychology. Rather, one needs to (a) consider the entire set of traits and (b) trace the organism's phylogeny, that is, the ancestral forms that produced it" (p. 188). In this spirit, instead of locating the evolutionary origins of promiscuity sex differences in evolved psychological dispositions, our biosocial model considers the broader patterns of behavior that emerge from the interaction between the bodily specialization of each sex and the attributes of societies' economy, social structure, and ecology. Although we have not considered sociosexuality from a phylogenetic perspective, cross-cultural comparisons provide insight into the development of social behaviors across simpler societies and those that are more economically, socially, and technologically complex. As we have shown, these comparisons provide an effective strategy for evaluating theories of the origins of human behavior.

The second to fourth digit ratio, sociosexuality, and offspring sex ratio

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Abstract: Previous research has suggested that offspring sex ratio may be influenced by the actions of prenatal sex steroids, principally androgens. The relative length of the second (index finger) to the fourth digit (ring finger) has been reported to be a proxy to prenatal testosterone levels. This trait is sexually dimorphic, such that males display a significantly lower 2D:4D ratio (indicating higher testosterone exposure), and this dimorphism appears robust across different populations. We suggest that digit ratio (2D:4D) may form a useful marker to help explain variation in sex ratio and sociosexuality.

According to parental investment theory (Trivers 1972) there are differences between men and women with respect to the amount of time and energy invested in their offspring. Consequently, it is supposed that the lesser-investing sex is usually more unrestricted in sociosexual orientation than the more-investing sex. Men should therefore demonstrate more unrestricted sociosexual orientation than women across human cultures. Schmitt suggests that the robustness of such a sex difference forms strong support for parental investment theory. He further notes that to date there is no study that has carefully examined environmental influences on sociosexuality, though the impact might be high, especially in light of theories concerning sex ratio.

Sex ratio is defined by the relative balance of marriage-age men to marriage-age women in a mating pool. It is considered high when men significantly outnumber women and is considered low when there are relatively more women than men in the mating market. According to Daly and Wilson (1988), in most cultures women typically slightly outnumber men because of a higher male mortality rate. Pedersen (1991) consequently argued that when sex ratios are low and there are more women than man, males become an especially scarce resource that women must compete for. Accordingly, Schmitt hypothesizes that cultures with lower sex ratios should possess higher levels of sociosexuality when men tend to desire promiscuous sex. In contrast, in cultures with higher sex ratios, lower levels of sociosexuality should be observed. The International Sexuality Description Project (ISDP) project found, as predicted, that sex ratios were significantly negatively correlated with national sociosexuality, and this finding is consistent with the view that cultures with more women than men possess mating systems driven by men's evolved desires for unrestricted promiscuous sex. However, in some cultures with more men than women, sociosexuality was found to be low, and the mating system is therefore supposed to be driven by women's desires for monogamous mating. But what might be the driving force of these remarkably stable effects across nations, and what might explain the variance between cultures?

Although the results reported by Schmitt are basically consistent with the sex ratio theory, it seems that the ISDP so far provides only limited explanations. For example, Schmitt argues that an alternative explanation could be that a low sex ratio in a culture may lead men to engage in greater intrasexual competition and mating efforts.

We suggest that (1) the variation in sex ratio across nations may be at least partly explained by prenatal androgen levels causing intrauterine stress and (2) the study of a potential hormonal basis would provide a more detailed picture about the variation of male–male competition across different cultures. James (1996; 1997; 2000) has presented evidence that high testosterone, in both male and female parents, at conception is associated with an increased sex ratio. Elevated levels of testosterone might be a result of intrauterine stress. However, the study of prenatal androgen action with respect to sex ratio theory across nations in a large-scale project such as the ISDP appears to be a difficult undertaking. There is now considerable evidence that the relative length of the second (the index finger) to fourth finger (the ring finger) (2D:4D) is a pointer to prenatal testosterone levels and may thus serve as a window to the prenatal hormonal environment (for a review, see Manning 2002). We propose that the study of 2D:4D ratio may provide a proxy to early androgen action and its implications for sex ratio theory.

There is evidence that this 2D:4D ratio is sexually dimorphic and is largely determined prenatally (Manning 2002). Males tend to show lower values of 2D:4D than do females; that is, males have on average longer fourth digits relative to their second than do females (Phelps 1952; Manning et al. 1998). Relative finger lengths are determined before birth (Garn et al. 1975), and the sex difference in 2D:4D seems to be present in children as young as 2 years (Manning et al. 1998). This sex difference in 2D:4D appears to be robust across a number of ethnic groups and races (Manning 2002; Manning et al. 2000; Peters et al. 2002). The sexual dimorphism in 2D:4D has been known for many years (e.g. Baker 1888), although it has only recently been suggested that sex differences in 2D:4D arise from in utero concentrations of sex steroids, with 2D:4D negatively related to prenatal testosterone and positively associated with prenatal estrogen (Manning et al. 1998). There is accumulating evidence for these relationships with sex hormones and sex-dependent behavior. For example, some sexually dimorphic traits favouring males are associated with low 2D:4D ratios such as left-handedness, autism, good visuospatial ability, and fast running speed. Other dimorphic traits favouring females are associated with high 2D:4D ratios – good verbal fluency and breast cancer (for review, see Manning 2002). Further, mothers with high waist-to-hip ratio (WHR), which is associated with high testosterone and low estrogen, tend to have children with low 2D:4D ratios (Manning et al. 1999). Children with congenital adrenal hyperplasia (CAH), a condition associated with high prenatal androgens, have lower 2D:4D ratios than do controls (Okten et al. 2002); and mothers with low 2D:4D tend to have children with low 2D:4D ratio, and their children possess high concentrations of testosterone in their amniotic fluid (Manning 2002).

Manning et al. (2002) hypothesized that if the suggestion by James (1996, 1997, 2000) were true, 2D:4D ratios of adults might be negatively related to the sex ratio of their children. This was tested in samples from English, Spanish, and Jamaican populations, and a negative relationship between sex ratio and 2D:4D ratio independent of sex and ethnicity of the parent was found. Manning et al. (2002) suggested that low 2D:4D individuals are more likely to have male offspring than those with a high 2D:4D ratio. These findings are consistent with James' (1996, 1997, 2000) suggestion that sex ratio varies according to exposure to environmental stress. We suggest that the study of associations among 2D:4D ratios across nations may provide further insight into sex ratio theory and its consequences for sociosexual orientation because of its nature as proxy to prenatal and adult levels of sex steroids. We argue that the variance in sex ratio is caused by exposure to early androgen levels and also suggest that sex-dependent behaviors and aspects of sociosexuality may correlate with 2D:4D ratio. Given that the sexual dimorphism in 2D:4D ratios appears to be a relatively robust trait across various human populations, 2D:4D is likely to be a valuable trait to study the hormonal basis of sociosexuality regardless of particular social influences.

Ethnography, cultural context, and assessments of reproductive success matter when discussing human mating strategies

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Abstract: The target article effectively assesses multiple hypotheses for human sexuality, demonstrating support for a complex, integrated perspective. However, care must be taken when extrapolating human universal patterns from specific cultural subsets without appropriate ethnographic contexts. Although it makes a strong contribution to the investigation of human sexuality, the basal reliance on a reductionist perspective constrains the full efficacy of this research.

In the target article, Schmitt tackles an extremely complex subject with an eye toward identifying mating strategies by using the Sociosexual Orientation Inventory (SOI) in a broad cross-cultural survey. Schmitt's conclusion that sociosexual differences "are predictable from several theoretical perspectives, none of which is conspicuously superior to the others" (sect. 7.5) is an important statement that clearly lays out an appeal for a broad, complexities-based approach to the topic. The application of this data set to hypotheses for human mating patterns and sexuality results in one of the strongest assessments of these hypotheses to date. The data