

deeply sex-negative and antifemale cultural indoctrination? It is highly doubtful that a study like this one is reaching beyond culture to any biological substrata where universal human traits may lie.

Another problem with using college students in this sort of multicultural study is that of class distinctions. In underdeveloped countries, only students in the highest class are likely to be fortunate enough to attend university. Indeed, a wealthy Ethiopian student may have much more in common with a British student than with a less well-off young adult from the Ethiopian countryside. Our field research in Africa suggests that sexual beliefs and behavior differ greatly among social classes and subcultures there and presumably in other parts of the world, as well (Jethá & Falcató 1991a; 1991b). Distorting effects of class and local subcultures are not addressed by Schmitt in the target article.

Another structural problem common to much research of this sort is related to theory underlying evolutionary psychology. One of the cornerstones of the discipline is the assumption that the vast majority of human psychological evolution took place in the so-called environment of evolutionary adaptedness (EEA) – normally defined as comprising that period bracketed by the first appearance of *Homo sapiens* and the origins of agriculture. According to this understanding, those of us living in nonforaging societies are somewhat ill-adapted to many aspects of our present environment and consequently suffer sometimes severe psychological and physiological consequences (Konner 1982). So it stands to reason that the search for *human universals* must include at least a few representative foragers, whose thought and behavior are not warped by the distorting effects of modern life. But there are no foragers among the 14,059 participants in this study. Existing research on the sociosexuality of foragers strongly confirms the existence of important similarities among unrelated foraging societies as well as dramatic differences from postagricultural sexual norms. (Beckerman & Valentine 2002) Swedes and upper-class Congolese may see themselves as very different from each other, but they may share important similarities from a forager's perspective.

Granted, it is no easy matter to distribute questionnaires in the Upper Amazon, but the difficulty or impossibility of including foragers in this type of research does not mitigate its vital importance. To his credit, Schmitt admits that “it would have been ideal to include additional samples from hunter-gatherer and tribal horticultural societies.” Indeed, Schmitt is very candid in discussing the shortcomings of the research, but despite these caveats, the results are repeatedly referred to as illuminating “cultural universals.” Although we sympathize with the difficulties faced by those seeking to uncover elusive human universals, future research will suffer greatly if we accept mistaken claims of success.

## Worldwide, economic development and gender equality correlate with liberal sexual attitudes and behavior: What does this tell us about evolutionary psychology?

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**Abstract:** Shortcomings in the target article preclude adequate tests of developmental/attachment and strategic pluralism theories. Methodological problems include comparing college student attitudes with societal level indicators that may not reflect life conditions of college students. We show, through two principal components analyses, that multiple tests of the theories reduce to only two findings that cannot be interpreted as solid support for evolutionary hypotheses.

We commend Schmitt for extending sociosexuality research to a broad multicultural sample and attempting to contrast several evolutionary theories of human mating. We share his interest in understanding human mating from an evolutionary perspective (Schachner & Shaver 2002; Scheib 2001) and welcome further tests of evolutionary hypotheses. Unfortunately, certain features of Schmitt's study limit the conclusions that can be drawn. Most importantly, the study did not provide an adequate test of Chisholm, Belsky, and colleagues' developmental/attachment theory (e.g., Belsky et al. 1991; Chisholm 1996) or Gangestad and Simpson's (2000) strategic pluralism theory, because of problems with the sampling procedures and the use of population-level measures of each country's reproductive environment and degree of gender equality. We explain these problems briefly below.

First, whereas the sampling procedure “allowed . . . a large number of cultures to be studied,” information about the cultures came from a special subset of the population – college students. As Schmitt notes, this “seriously limited the representativeness of national SOI profiles . . . [making] generalizations beyond college-aged populations . . . inappropriate” (sect. 7.1). Although Schmitt was able to compare average SOI scores from college students across countries, he could not perform legitimate tests based on variables at the societal level. For example, he tried to test developmental/attachment theory by examining the sociosexual attitudes and behavior of college students from countries with reproductively difficult versus less challenging environments. But it is in countries with reproductively difficult environments where one would expect college students to be least representative of the entire population. In cases where a large proportion of college students are members of the economic elite, they are a misleading sample on which to test ideas that apply mostly to the poorest, most stressed segment of society. Schmitt acknowledges this (sect. 6.7.1) yet still proceeds, following a logic that is akin to asking Stanford students about their sociosexual attitudes and then using their answers to test a theory likely to apply best to people living in the poor sections of Oakland. Not surprisingly, Schmitt finds no support for developmental/attachment theory using his method. Sampling from a wider range of countries (e.g., Jordan, India, Indonesia) with “more stress-related variability,” as suggested by Schmitt, does not solve the methodological problem.

Second, to identify countries with reproductively difficult environments and measure their levels of gender equality and economic development, Schmitt used population-level indicators such as infant mortality, low birth weight, and child malnutrition (measures of reproductive difficulty), the gender development index, percentage of women in parliament, divorce rate, and women's sex-role ideology (measures of gender equality), and gross domestic product and human development index (measures of economic development). These measures apply to the population as a whole and may not be representative of college students in a particular country. Thus, the meaning of Schmitt's correlations between sociosexual attitudes and behavior, on the one hand, and population-level measures on the other, depend on the similarity of the college students sampled to the general population on which societal indicators are based. If the college students in a particular society are more liberal than their fellow citizens, as is likely in the US, for example, the findings will be distorted in one direction, but if the students in a society are less liberal than their fellow citizens, as might occur where students attend religiously conservative schools, the correlation will be distorted in the other direction. Thus, the finding that students in more reproductively challenging countries tend to be more restricted in their sociosexuality may indicate a real association or a misleading artifact. We cannot tell without knowing more about how the college samples in various countries differ from other people in those countries.

Schmitt also used population-level measures to conduct multiple tests of developmental/attachment theory versus strategic pluralism theory. Table 5 outlines the predicted associations, based on each of the theories, between sociosexuality and nine of the

population-level indicators. Schmitt finds that eight of the nine relationships are in the direction predicted by strategic pluralism theory, resulting in what looks like strong support for that theory and little support for developmental/ attachment theory. Tables 8–10 appear to provide further support for strategic pluralism theory. In fact, however, what appear to be multiple tests of these theories can be reduced to just two, because all of the population-level measures can be reduced to two principal components. In a principal components analysis of the correlation matrix in Table 4, we found that economically prosperous societies also have higher human development indexes, greater life expectancies, lower birth rates, lower teen pregnancy rates, lower infant mortality rates, lower fertility rates, higher average birth weights, and so on. (Not all variables could be included in our analysis because the matrix is not positive definite, but if we had been able to use the raw data, the other variables would most likely have loaded on the primary factor, too.) Only one principal component had an eigenvalue greater than 1.0; it accounted for 79% of the variance. All seven of the variables in the positive definite matrix loaded above .70 on this factor, with most loading above .90. Thus, all of the findings related to the correlation matrix reduce to one: College students in economically better off societies report more liberal sexual attitudes and behavior than students from poorer, less developed societies.

Similarly, the measures of gender equality in Table 8 form a single factor (accounting for 68% of the variance) that correlates with both our poverty/wealth factor and liberal sociosexuality. Hence, what looks like 13 associations between gender equality and sociosexuality can be reduced to one: College students, especially women, in countries with greater gender equality report more liberal sexual attitudes and behavior. As before, there is no way to draw conclusions about evolutionary psychology from this finding. In other words, Schmitt inadvertently created a situation in which evolutionary theories predict nothing more than one would expect without reliance on neo-Darwinian theory.

## Fitting data to theory: The contribution of a comparative perspective

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**Abstract:** In this commentary, I consider Schmitt's cross-cultural investigation of sociosexuality from a comparative perspective. I argue that such a perspective lends support to an evolutionary explanation of a number of Schmitt's findings, including universal sex differences in sociosexuality and the sensitivity of mating behavior to contextual variables such as sex ratio.

Schmitt's cross-cultural survey of sociosexuality is a genuinely outstanding achievement. The data he presents are powerful and convincingly demonstrate sex differences and national differences in the extent to which people engage in monogamous versus promiscuous mating. However, the pattern of results and the explanation of those results are two separate issues. In this commentary, I address the latter issue. The question I explore is this: How confident should we be in attributing Schmitt's findings to evolutionary selection? To answer this question, I place these findings within the framework of a comparative perspective. My conclusion is that, in many cases, adopting this perspective does indeed support an evolutionary interpretation of Schmitt's findings.

The clearest example relates to what is probably Schmitt's least controversial finding: that in every nation surveyed in the International Sexuality Description Project (ISDP), men are more oriented toward promiscuous mating than women. How does a comparative perspective inform the interpretation of this result? The most striking thing about Schmitt's finding from a comparative perspective is its consistency with a major trend found in the ani-

mal kingdom, namely, that the sex that invests less in offspring tends to exhibit more interest in indiscriminate mating with multiple partners than does the higher investing sex (Trivers 1972). When speaking of nonhuman species, theorists inevitably explain this sex difference in evolutionary terms. For example, no one would wish to explain the greater pursuit of sexual partners by male than female turkeys or frogs as a product of arbitrary cultural whims or patriarchal norms. Given that we accept an evolutionary explanation for this sex difference in other species, it would seem tenuous to argue that the same phenomenon in humans is wholly a product of a completely different cause: learning or culture. Certainly, it is possible. However, we should have a strong reason to make this exception. Without such a reason, the default interpretation of the data should be that we are continuous with the rest of nature and thus that the sex difference in sociosexuality has an evolutionary origin.<sup>1</sup> Conversely, a higher standard of evidence should be demanded of theories that claim that this difference is explicable entirely in sociocultural terms. The general point here is that, to the extent that an aspect of human behavior is consistent with patterns found in the rest of the natural world, the onus of proof should fall more to advocates of nonevolutionary explanations of that behavior than to advocates of evolutionary explanations.

Next consider the finding that differences in national levels of sociosexuality are related to differences in variables such as sex ratio and environmental demand. Schmitt interprets this result in terms of the operation of a flexible evolved mating psychology, sensitive to evolutionarily significant ecological conditions. At first glance, the type of argument used above might not seem to support this position. It might be argued, for example, that most species have relatively inflexible mating systems: Chimpanzees are polygynandrous, gorillas polygynous, and gibbons monogamous (socially if not always sexually; Reichard 1995). However, the type of flexibility posited by Schmitt and other evolutionary psychologists is not without precedent among nonhuman animals. Variable mating systems are particularly common among birds (Castro et al. 1996; Dobson et al. 2000; Sorenson 1992). Furthermore, in many cases, they are responsive to variables such as those investigated in the target article.<sup>2</sup> One of the best examples of a species with a variable mating system is the dunnoek, a small brown bird whose repertoire includes monogamy, polygyny, polyandry, and polygynandry (Davies 1985; 1989; Hatchwell & Davies 1990). The mating system found in a given dunnoek population is determined by various factors, including sex ratio and resource availability. The existence of variable mating systems in dunnoeks and other birds increases the plausibility of the claim that variability in human sociosexuality across different environments can be attributed, at least in part, to evolutionary selection.

Admittedly, this argument is weaker than that for evolved sex differences in sociosexuality. After all, variable mating strategies are less common in the animal kingdom, and the best examples are found in birds rather than more closely related species. Furthermore, there may be important differences in the mechanisms underlying variable mating in birds versus humans. As Schmitt's data show, in the human case, shifts in the prevailing mating system appear to involve changes in individual mating psychology, including attitudes and fantasies. In contrast, Davies (1985, 1989) has argued that, although dunnoek mating systems change, individual mating preferences do not. Instead, the mating strategy pursued by males differs from that pursued by females, and any shifts in mating system represent different outcomes of male-female conflict in different contexts. For example, when the sex ratio is female-biased, males are better placed to enact their optimal mating strategy (polygyny); whereas when the sex ratio is male-biased, females are better placed to enact theirs (polyandry).<sup>3</sup> Considerations such as these weaken the argument presented in the preceding paragraph. Nonetheless, at the very least, the comparative evidence suggests that functional explanations of cross-cultural differences in sociosexuality cannot simply be dismissed as the overenthusiastic application of adaptationist reasoning. They