

(with very different diet and exercise patterns), father absence delays menarche, does not advance it (as in nonhunter gatherer samples): This suggests that interactions between diet and paternal presence produce a much earlier sexual maturation trajectory today (Waynforth 2002). This reinforces the need to include hunter-gatherer data in cross-cultural studies and the need to cover a broader developmental trajectory (e.g., younger to older samples developmentally).

A developmental trajectory with later pair-bonding across cultures is apt to increase the number of sexual partners before pair-bonding. Using Schmitt et al.'s (2003b) cross-cultural samples, the average point at which men and women desired no new partners (between adjacent time frames into the future) was significantly correlated with SOI values: $r = .46$ ($p = .001$) for women; $r = .37$, ($p < .01$) for men. Furthermore, men reach this point later than women in these samples (Miller & Wilcox, in preparation). Men tend to marry later than women across cultures (United Nations Statistics Division 2001).

What nonevolved differences in our environments today could contribute to sex differences in mating beyond those mentioned above? Chemicals routinely provided in delivery could sex-differentially impact neuromodulator regulation and that in turn does impact caregiving and pair-bonding mechanisms, as has been found in pair-bonding voles (Carter 1998; 2003). Furthermore, circumcision (Taddio et al. 1997), prenatal chemical and substance exposure (Moe & Slinning 2001; Wakschlag & Hans 2002) and birth trauma (Eogan et al. 2003) all differentially impact sex differences in offspring emotional regulation, reactivity, and/or neuromodulator regulation (see also, Herskovits et al. 1999).

Evolutionary theories of mating need to contain and will be evaluated by the adequacy and plausibility of their underlying embodied mechanisms (e.g., ties to neuromodulators, specific genetic mechanisms). Therefore, AFT not only can explain the data in the target article, but it offers greater promise for better specifying the links between these underlying mechanisms, parameter differentials, and emergent mating behaviors (Miller et al., in preparation).

NOTES

1. Low SOI scores may include not only those who follow a more monogamous mating strategy (sect. 7.5) but those who are not interested in having any sexual partners (up to 5% of the males in some of our samples). Furthermore, the SOI contains items using very different metrics, and a standardized composite is not formed: Instead, a weighing formula is used without a clear conceptual basis. In addition, many of the items are open-ended variables (e.g., number of partners desired in the next five years) that are heavily skewed (Pedersen et al. 2002), making them unsuitable for parametric analyses. The median test employed by Schmitt is known to be problematic for testing median differences (Miller & Wilcox, in preparation). The Mann-Whitney U test tells us that there are distributional differences between men and women, but not whether those differences are at the median or deep into the tails: Newer methods allow us to assess this (Miller & Wilcox, in preparation). In short, conceptually and psychometrically these measures could be improved.

2. Harlow's research (discussed by Bowlby [1969/1982]) provides a model of how diversity in mating outcomes can result from departures from the adapted-for environment (e.g., absent or impaired maternal caregiving). Clearly Harlow's monkeys (and apes) that were removed from their mothers by humans and given cloth alternatives did not *evolve* a sensitivity to environmental cues that produced the differential mating and sexual outcomes experienced by these primates.

3. Ultimately, relative support for alternative evolutionary theories will rest on providing models of the underlying biochemically based evolved mechanisms (and their control parameters) – and how these operate and are effected. We are learning enough about the biochemical underpinnings and genetic processes here to specify in more detail (than is provided) some plausible mechanisms. For example, regulatory genes seem to have evolved to directly impact mating strategies in voles (e.g., more monogamous versus more promiscuous) by ensuring (or not) that there are sufficient oxytocin receptor sites in the dopamine reward pathways (Insel 1997). This genetic mechanism would enable (or not) the specific partner preference phase and later attachment stages (mentioned in Figure 1) that are necessary in affording pair-bond formation. But, these effects occur between species and occur in embryonic brain development (Insel

1997; Young et al. 1998) – requirements that do not fit with either DA or SPT.

4. Solely promiscuous species may not have mechanisms for partner preference formation, whereas pair-bonding species are likely to have evolved chemical and biological mechanisms to support most, if not all, of these mechanisms. Some species, especially among primates, may evolve partner preference mechanisms and perhaps some, but not enough other mechanisms, to support enduring pair-bonds. It's an intriguing possibility that species may differ along a continuum of mechanisms that together afford pair-bonding.

5. Bowlby (1968/1982) said that, "although regarded as distinct behavioral systems, attachment behavior and sexual behavior are believed to have unusually close linkages" (p. 230). The sexual circuitry system, which is heavily impacted by positive and negative emotions, dovetails well with these systems (Miller et al., in preparation). Sustained negative emotions and/or insufficient positive emotions may serve as cues that the relationship is unlikely to last and offspring production should be avoided because, in the absence of biparental care, such offspring would be far less likely to survive.

Less restricted mating, low contact with kin, and the role of culture

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Abstract: On the basis of a reinterpretation of the International Sexuality Description Project (ISDP) data, we suggest that findings are consistent with the view that human reproductive behaviour is largely under social control. Behaviours associated with a high Sociosexual Orientation Index (SOI) may be part of a progressive change in reproductive behaviour initiated by the dispersal of kin that occurs as societies modernize.

As Schmitt acknowledges, his perspective of sociosexuality as the result of a collection of psychological adaptations is limited in scope and does not account for the observed influence of cultural factors such as religion and political ideology on reproductive behaviour. A long tradition in social and cultural psychology argues that individual attitudes do not arise in a social vacuum, but through social interaction and exchange (Mead 1934/1967; Tajfel 1972; Turner 1991). This explains why, for example, individuals within social networks that hold common religious or political beliefs also share beliefs about appropriate mating behaviour.

In a similar vein, Boyd and Richerson (1985) argue that, in humans, reproductive behaviour is constrained by genetic influences, but strategies are remodelled to fit different environmental conditions, not by evolved mental modules, but by the cultural evolution of norms and institutions. The tendency to find mating pleasurable may be part of human biology, but ideas about with whom to mate and when it is appropriate to mate are informed by observing others and taking note of the information and evaluations they communicate.

Modern humans do not achieve levels of reproductive success consistent with the availability of resources. Models that maintain that reproductive choices emerge from an individual's striving to maximise fitness do not explain this as well those that assume that human reproduction is, to some extent, under social control. The process of modernization involves a suite of cultural changes, which includes profound changes in reproductive behaviour. These changes, which have become known as the "Demographic Transition" (Notestein 1953), break the link between access to resources and reproductive success, a link that has been amply observed in traditional societies (e.g. Borgerhoff Mulder 1988a; Chagnon 1988; Cronk 1989; Hill & Hurtado 1996; Irons 1979; Vining 1986; Wang et al. 1995; and reviews by Cronk 1991 and Low 2000).

Knodel's (1986) analysis of the demographic records of German villages during and just prior to the time the population went

through the Demographic Transition reveals the nature of the change. From 1825 to 1900, the average age at which a woman gave birth to her last child dropped from over 40 to below 38. Prior to 1825, a woman continued to bear children until the menopause, so couples who had not lost children as a result of disease or accident had greater reproductive success. But as the century progressed, women who had not lost children were more likely to stop childbearing early, allowing less fortunate couples to catch up. Such an apparent abandonment of reproductive competition sits uneasily with the assumption that human reproductive attitudes and behaviour are evoked by psychological adaptations designed to promote reproductive decisions that maximise fitness in response to ecological conditions.

Studies of historical and contemporary fertility declines are consistent with the idea that reproduction is under social control. The adoption of family size limitation is associated with a widening of social networks that allows increasing interaction between people of different communities (Bongaarts & Watkins 1996; Kohler 2001; Watkins 1991). One result of such a change is a decrease in contact between kin and a rise in contact between nonkin. Because nonkin have no genetic interest in encouraging one another to behave in ways likely to lead to reproductive success, the reduction in influence from kin could result in a drift away from cultural norms that provide social rewards for family creation.

Two lines of empirical evidence support this suggestion (Newson 2003, Newson et al. 2005). Role-play studies have shown that when the purported recipient of reproductive advice is a daughter, women are more likely to advise behaviour likely to lead to reproductive success than when it is a friend. And people who have more contact with kin have more children at a younger age.

Without the influence of kin to keep behaviour directed toward competing for reproductive success, activity within the social network is likely to become increasingly inconsistent with the efficient conversion of resources into offspring. A superficial look at changes in the reproductive behaviour of European populations suggests that this is the case. The increased prosperity that follows modernisation allows virtually everyone to reproduce, and after the Second World War, Europeans (in Europe and former European colonies) took advantage of this. Most people married and had families, and even though family sizes were limited, many people became parents at a relatively young age, creating the birth-rate rise known as the “baby boom.” Then cultural values changed so that the status associated with motherhood declined. It became increasingly common for individuals to postpone marriage and childbearing or to forgo it completely. Same sex partnerships also became increasingly common and accepted even though creating a family is more difficult in such a relationship.

In a modern population, unrestricted mating is not likely to enhance fitness but it can reduce fitness, particularly in women, because of the associated risk of infertility due to sexually transmitted infections. Could unrestricted mating be part of a progressive abandonment of behaviours consistent with reproductive success? If so, SOI scores, particularly those of women, should be higher in cultures that were the first to experience a decline in contact with kin and the family size. The ISDP data reported in the target article support this hypothesis. European cultures were the first to modernize, and participants of European ancestry had significantly higher SOI scores than any other ethnic category.

The data can, therefore, be interpreted in a way that is very different from those offered by Schmitt – one that suggests that important aspects of reproductive behaviour are under social rather than individual control and that humans strive for reproductive success through cultural mechanisms.

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Universal human traits: The holy grail of evolutionary psychology

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Abstract: Although the search for universal human traits is necessarily the principle focus of researchers in evolutionary psychology, the habitual reliance on undergraduate students introduces profound doubts concerning resulting data. Furthermore, the absence of relevant data from foraging societies undermines claims of cross-cultural universality in this paper and in many others.

Evolutionary psychology revolves around the quest for universal human traits. If a cognitive or behavioral trait can be shown to exist cross-culturally, researchers are often quick to claim it is universal and may therefore provide a glimpse into human nature. Prominent examples would include Buss (2000), with his research on sexual jealousy; Fisher (1992), with her work on long-term pair bonding; and Ridley (1996), with his theories of altruism. In the target article, Schmitt sets off along the same path, hoping to elucidate universal human sociosexual characteristics with data from 48 countries.

But Schmitt has chosen a difficult and dangerous path. For all its apparent breadth, this type of research often suffers from a lack of methodological depth. Schmitt and his colleagues succumb to the same temptation that plagues so much sexuality research: reliance on a subject population more convenient than representative. The vast majority of the respondents in this study were university students. (Note: Schmitt writes that they are “college-aged,” and in many of the countries surveyed, “college” refers to preuniversity or high school, but we assume he is referring to university students). We understand that undergraduate students are easy for many researchers to locate and motivate (e.g., by offering partial course-credit for returning a questionnaire), but this does not in any way make them valid representatives of human sexuality. Far from it. Even in liberal western cultures, college-aged people are normally in the very early stages of their sociosexual development with little, if any, experience to draw on when considering questions about one-night stands, long-term mate poaching or the ideal number of lifetime sexual partners, for example. In more restrictive cultures, this inexperience can only be more pronounced and thus impart even more bias to the research. In sexuality research, convenience and accuracy are often opposing forces.

As Schmitt points out, “because the . . . samples were primarily college students, any generalizations beyond college-aged populations would be inappropriate” (sect.7.1). He continues, “Importantly, the sociosexual lives of college-aged individuals may be quite different from older and more experienced men and women.” Quite so. Notwithstanding this caveat, Schmitt is clearly in search of universals, as he states here:

One of the objectives of the present study was to evaluate whether sex differences in sociosexuality are robust across the broad range of human cultures represented in [the ISDP]. Finding universal sex differences in sociosexuality would support parental investment theory (Trivers 1972), as well as other evolutionary perspectives on human mating (Alexander & Noonan 1979; Buss & Schmitt 1993; Gangestad & Simpson 2000; Hinde 1984; Symons 1979; Wilson 1987).

Whatever one may find in such a narrow sample pool, it is unlikely to be *universal*.

Beyond the limitations related to the subjects’ age, many of their responses are likely to have been deeply distorted by cultural pressures. In many Islamic countries, for example, a prostitute is popularly defined as “an unmarried woman with knowledge of sex.” What sort of self-reporting bias can be expected from presumably unmarried, female college-aged respondents being asked about their sexual experiences and fantasies in countries with such