

Promiscuity in an evolved pair-bonding system: Mating within and outside the Pleistocene box

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Abstract: Across mammals, when fathers matter, as they did for hunter-gatherers, sex-similar pair-bonding mechanisms evolve. Attachment fertility theory can explain Schmitt's and other findings as resulting from a system of mechanisms affording pair-bonding in which promiscuous seeking is part. Departures from hunter-gatherer environments (e.g., early menarche, delayed marriage) can alter dating trajectories, thereby impacting mating outside of pair-bonds.

Many of Schmitt's findings are consistent with Attachment fertility theory (AFT; Miller & Fishkin 1997). First, every evolutionary theory, including ours, argues for a diversity of mating outcomes (e.g., short- to long-term) beyond monogamy alone. Second, Miller and Fishkin (1997) argue that with the post-Pleistocene advent of agriculture, father presence was less consistently important for offspring survival, producing more diversity in mating outcomes. When fathers mattered, pair-bonding was more likely: Pair-bonding is less likely in environments that depart from those experienced by hunter-gatherers (Miller & Fishkin 1997). If we assume that low scores on the Sociosexuality Orientation Inventory (SOI) are adequately measuring pair-bonding propensities and Schmitt's sociocultural variables include those like hunter-gatherer environments (e.g., vulnerability of offspring; daughters who are married by about 18 years of age) versus those unlike hunter-gatherer environments (e.g., high average life expectancy; high accumulated nonshared economic resources), then a similar pattern of correlations would be predicted by AFT (Miller & Fishkin 1997; Miller et al., in preparation).

Evolutionary theories of mating differ in the *underlying, evolved mechanisms that produce these patterns of behavioral diversity* and in whether and how these mechanisms interact with Pleistocene-like (e.g., hunter-gatherer) and post-Pleistocene conditions. Strategic pluralism theory (SPT) and developmental attachment (DA) theories argue for evolved mechanisms sensitive to early childhood (Belsky et al. 1991) or local conditions (Gangestad & Simpson 2000; see target article) producing a more restricted or unrestricted mating pattern.² But, their model of how this type of mechanism might plausibly operate is underspecified.³

Attachment fertility theory argues that biparental care *always mattered throughout the Pleistocene* – our environment of evolutionary adaptiveness (EEA). Up to 50% of today's hunter-gatherer offspring perish before adulthood: With responsive paternal caregiving perhaps 80% survive (Geary 2000). Across all mammals where biparental care historically mattered for offspring survival, males and females evolve more homologous (sex-similar) chemical and biological caregiving, pair-bonding, and mate selection mechanisms (Ziegler 2000), with the evidence to date supporting this claim in humans (Miller et al., in preparation; Wynne-Edwards 2001).

Consistent with Hazan and Zeifman 1999, AFT argues for universal, sex-similar, evolved mechanisms leading up to and affording pair-bonding. These could also quite naturally (see Figure 1) produce short-term and other types of dating as by-products (Miller et al., in preparation; Miller & Wilcox, in preparation). That is, humans and other primate species, from those more promiscuous to pair-bonders, engage in the seeking of sexual relationships with possible mates, that is influenced by hormones (Dixon 1998; Fisher 2000)⁴. This "preattachment phase" (Hazan

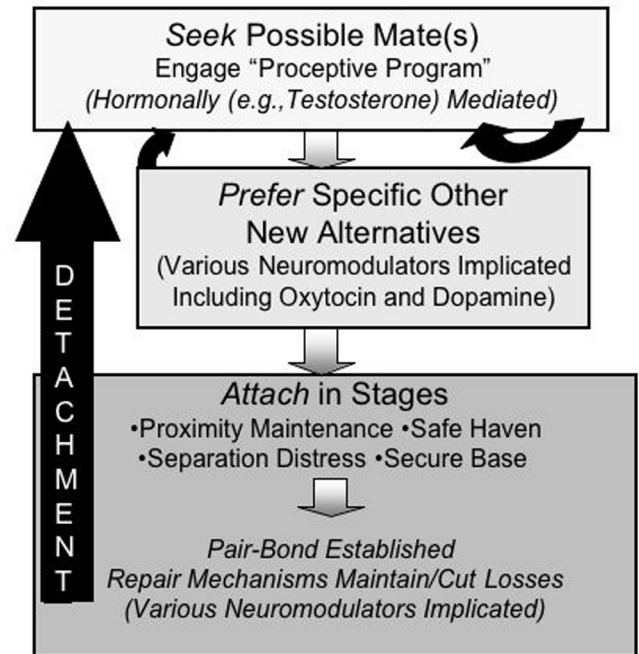


Figure 1 (Miller et al.). Universal (sex-similar) systems of mechanisms afford enduring pair-bonding (shaded boxes and arrows) while producing dating outcomes (from short-term to nonenduring pair-bonds) as by-products (solid black arrow). The number of these depends, in part, on time until an emotionally close pair-bond and whether that bond is maintained. Other mechanisms afford relationship repair (e.g., protest, despair) and even permanent detachment when there is sufficient sustained negative or insufficient positive affect. Then, the process can begin anew. Variability in mechanism parameter settings (e.g., relative levels of neuromodulators) as a result of experiential, maturational, and biological factors produce emergent within and between-subject diversity in mating outcomes over time.

& Zeifman 1999) is associated with flirtatious or "proceptive behavior" (Eibl-Eibesfeldt 1989). For species that are not exclusively promiscuous, this leads to a specific partner preference phase that is heavily mediated by oxytocin release in humans (see Hazan & Zeifman 1999; Miller et al., in preparation) and prairie voles (Insel 1997). A third phase follows with a series of attachment stages that Hazan and Zeifman have identified in humans. From preattachment to established bond, there are parallels in child-parent attachment (Hazan & Zeifman 1999), and in monogamous voles (Carter 1998, 2003; Insel 1997). The underlying evolved mechanisms can, at least plausibly, be tied to species-wide neuromodulator mechanisms that afford individual variability in parameter settings⁵ (Miller et al., in preparation; Insel 1997).

We would argue that humans typically desire to eventually pair-bond. Across Schmitt et al.'s (2003b) 10 world regions (with Oceania being the sole exception), the median number of partners in 30 years desired for both men and women is actually one (Miller & Wilcox, in preparation), consistent with our earlier U.S. samples (Miller & Fishkin 1997; Pedersen et al. 2002). More than 98.9% of men and women in our college samples (the predominant group sampled, albeit globally, in the target article) want to "settle down" in a long-term relationship by five years into the future: In the interim, they want to date (Pedersen et al. 2002). Laumann et al. (1994), across representative cohorts, similarly found dating preceding (and following) long-term commitment.

Attachment fertility theory (Miller et al., in preparation) points to numerous post-Pleistocene changes enhancing variability in mating outcomes. For example, within hunter-gatherer societies

(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