Adding the missing link back into mate choice research

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Abstract: Evolutionary psychologists should go beyond research on individual differences in attitudes and focus more on detailed models of psychological mechanisms. We argue for complementing attitude research with agent-based computational modeling of mate choice. Agent-based models require detailed specification of individual choice mechanisms that can be evaluated in terms of both their psychological plausibility and the population-level outcomes they produce.

A fundamental step in studying the connections between evolution and behavior is that of postulating the psychological mechanism responsible for a given adaptive behavior – evolutionary psychology's "missing link" (Cosmides & Tooby 1987). Orientations and attitudes are not mechanisms, and are not necessarily predictive of behavior (e.g., Ajzen & Fishbein 1977). Attitude researchers usually deal with this prediction problem by constructing new scales and measuring more variables. Schmitt is no exception in hoping for future studies to include "additional measures and variables" (sect. 7.5). However, our understanding of the cognitive mechanisms underlying mate choice is unlikely to improve with the unprincipled proliferation of variables to scrutinize. The *attitudes-without-process approach* may be one reason why Schmitt ends with the somewhat disappointing observation that differences on the Sociosexual Orientation Inventory (SOI) are predictable from several perspectives, leaving researchers little the wiser about which is most appropriate. Instead, we advocate a *process-with-attitude approach*, aiming to uncover how people process information, possibly in conjunction with their sexual attitudes, on the way to mate choice (Miller 1997). Specifying how mate choice mechanisms may work can also indicate just what measures and variables are needed to explain behavior, and because less can be more in environmentally situated decision making (Todd & Gigerenzer 2000), we may even find that attitudes do not prove strictly necessary in our models.

A useful form of modeling for studying mate choice and other social phenomena is agent-based computational modeling. Such models force one to specify how individuals meet, learn over time, and make decisions about potential partners. The behavior of such models can then be tested at the individual level, seeing if the predictions of the information-processing mechanisms match observed subject behavior. Importantly, these models can also be tested at the population level, for example, analyzing how the simulated individuals pair up (i.e., get married), when they get paired, and how well-matched the pairs are, and then comparing this to relevant demographic data (Billari & Prskawetz 2003).

Agent-based models of mate choice create a set of simulated individuals of both sexes that go about finding a partner in a well-defined mating environment. In Todd and Billari's (2003) model, agents live out a life composed of different steps: grow to marriageable age while learning something about the mating environment; look for a mate; find an acceptable potential partner and make a courtship offer; if accepted, pair up; if not, get a bit older, possibly learn something from the experience, and try again. Simulated individuals were endowed with a psychologically plausible decision mechanism, in which an aspiration level for desired mate quality is set through early experience, and any later-encountered potential mate above that level is courted. This simple type of heuristic embodies the principles of bounded rationality (cf. Todd & Gigerenzer 2000) at the individual level and fares well at the population level in explaining demographic patterns of human mutual mate search such as the distribution of ages at which people first get married.

Simão and Todd (2003) applied a similar model to test how population sex ratio can affect age at first marriage. According to their model, populations with skewed sex ratios should show lower mean age at first marriage, at least for the less common sex, because they are able to form and meet their aspiration level sooner given the abundance of potential mates. The same hypothesis follows for high sex ratios from the target article. Populations with a high operational sex ratio, those with more men than women, should be oriented towards women's preferences as the limiting factor, and thus should show lower SOI scores. Low SOI goes along with a tendency towards monogamy and, accordingly, to lower mean age at first marriage for women. Schmitt's data are compatible with this hypothesis: There is a positive relation between SOI and mean age at marriage for women (see Table 5 in the target article; note, though, the puzzling lack of relation between sex ratio and women's mean age at marriage in Table 4, which must be further looked into). However, although both approaches make the same prediction, Simão and Todd's model makes no assumptions about individual attitudes towards sex; instead, the results emerge from the dynamics of the search process in the simulated population.

The two approaches make distinct predictions for cases of a low sex ratio. Simão and Todd's model predicts that when females outnumber males, men should get married earlier because of their increased opportunities to find a suitable mate. The opposite follows from Schmitt's perspective in which men are predicted to be less motivated in pursuing monogamous relationships. The two predictions cannot be decided between at this point because the target article does not report data for men's mean age at marriage.

Process models also produce other testable predictions about issues on which less precise theories remain silent. For example, Simão and Todd's model predicts that the degree of assortative matching on quality between mates should decrease as a population deviates from the fully balanced sex ratio. This occurs because the quality variation among mated individuals of the more common sex gets smaller – only the high-quality individuals will be selected as partners – which in turn implies reduced correlation in quality between the sexes.

Making such predictions is of course risky for any model. They can be readily tested, and they may turn out to be wrong. One possible outcome of this enterprise would be a refutation of at least part of Simão and Todd's model. It may well be the case, for example, that some sort of attitudinal or motivational aspect – like SOI – must be included in the model for it to account for the relation (or lack thereof) between sex ratio and age at marriage for men. This is just the sort of interplay that should go on between mate choice process models and the valuable body of cross-cultural data produced by the research of Schmitt and others. By building models of psychological mechanisms and confronting them with the facts, we can reforge evolutionary psychology's missing link and hammer out ever more detailed and accurate models in the process.

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