

Relationship signal detection: Integrating the roles of gender, personality, and contextual cues on relationship perception and intent biases

Men are more likely to perceive a woman's friendliness as sexual interest, and this pattern holds up across surveys, actual behaviors, and beyond lab conditions [1-3]. Although communication about sexual interest have always been complicated, they recently have become legal and societal issues. A more complete understanding of how individuals communicate about sex is necessary, especially when 23.1% of college women experience sexual assault [4].

Intellectual Merit

Error management theory (EMT) explains this "sexual overperception" effect in men as a strategic bias favoring specific types of judgment errors over other types of errors. Differential parental investment theory [5] states that male mammals are less physically obligated to invest in offspring, so they tend to be more willing to engage in sexual activity, whereas females are more selective about potentially costly sexual activity. For males, the error of "missing" an interested female is costlier than the "false alarm" error of judging an uninterested female as interested, resulting in a pattern of decisions that adaptively reduces costs and increases benefits, even as it fails to minimize errors overall.

EMT is, at its core, Signal Detection Theory (SDT) applied to intersexual relationships [6], using differential parental investment to model the costs and benefits of relationship decisions. SDT is a way to describe how observers judge the presence or absence of a "signal" when the given stimuli have some level of ambiguity ("signal + noise") [7]. **The division of EMT from SDT has resulted in an unnecessarily restricted analysis of data that could present a fuller explanation of behavior if analyzed using signal detection models.** Although EMT, like SDT, considers different judgments and possible outcomes, it ignores several extensions and implications which a full SDT analysis can provide. For instance, EMT does not consider the base rates of signals compared to noise (that is, the frequencies with which signals and noise occur in the environment), and how that influences judgments. Very common true signals, with rare non-signals, will encourage signal-present judgments in ambiguous situations (known as a liberal bias). Conversely, a low signal rate and common non-signals will encourage no-signal judgments (known as a conservative bias). Additionally, SDT provides a measure (sensitivity) of how well people distinguish signals from noise.

One benefit of this approach is that concepts already developed within SDT can transfer to EMT contexts. At the theoretical level, SDT specifies situations in which both men and women should have systematically different signal detection strategy profiles. Individuals with faster (v. slower) life history strategies, more unrestricted (v. restricted) sociosexuality, and more short-term (v. long-term) mating orientation should show more liberal biases (**Hypotheses 1-3**). Similarly, people high in mate value should show a liberal bias because their experience is of a higher signal base rate (**H 4**), which EMT cannot predict as it does not take signal/noise ratio into account. It also is possible to manipulate aspects of the social situation, and thus the value of decision outcomes, by manipulating the attractiveness of the stimuli used as signals (**H 5**) and by changing the signals-to-noise base rates through exposure to different sex ratios of stimuli (**H 6**).

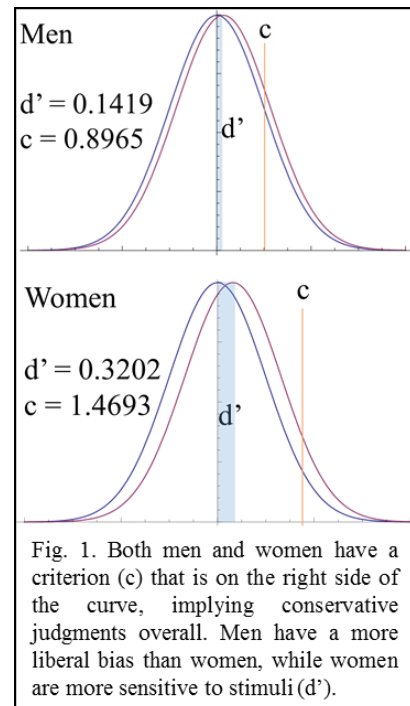
Additionally, methods and analyses from SDT research can be used to more fully understand and analyze existing EMT results. For preliminary results, I analyzed the data from Perilloux, et al. [8] using SDT. This confirmed that men are more liberally biased in perceiving sexual interest, but also yielded unanticipated insights: Women are more sensitive to the difference between sexual interest versus non-interest (d' in Figure 1), and -surprisingly- both men and women in this study are conservatively biased in perceptions of sexual interest (c in

Figure 1). Differential parental investment theory predicts why men have a lower sensitivity than women, as females may conceal their signals of sexual interest, making it more difficult for men to differentiate signal from noise. This also may explain why men are more liberally biased than women, since they need to compensate for their lower sensitivity to maintain the same level of optimality at detecting sexual interest. This difference in sensitivity led to an additional hypothesis that men's sensitivity will increase as the woman's sexual cues become more overt (**H 7**).

Methodological Approach – My stimuli will include 96 video clips showing heterosexual pairs engaging in conversations. Each videotaped person will rate their sexual interest in their conversation partner, then complete questionnaires to evaluate individual differences (described above). **Method:** Studies will involve participants watching the muted clips and rating each actor regarding their levels of sexual interest in their conversation partner. Multiple study variations will look at influences of the observers' life history strategy (**H 1**), socio-sexual orientation (**H 2**), mating strategy (**H 3**), and mate value (**H 4**). Additionally, experimentally manipulated sets of clips will be shown to evaluate the causal effects of skewed ratios of attractiveness of each conversant (**H 5**) in the video clips, prior exposure of participants to skewed sex ratios (**H 6**), and exposure to overt sexual cueing (**H 7**). Analysis will use both EMT and SDT methods, utilizing multilevel probit regression to determine c and d' for this repeated measures design. [9]

Broader Impacts

Underrepresented Minorities in STEM: Efforts will be made to recruit underrepresented and first-generation undergraduates as research assistants, who will be encouraged to learn about the research process, present results at conferences, and participate in authorship of publications. **Increasing Scientific Literacy and Public Engagement with STEM:** Research about romantic relationships often gets public media attention, which will be used to broadly communicate the results of this research and bring attention to current directions in psychological science. This research will also be presented at regional and national conferences. **Improving Individual Well-Being:** This SDT approach will increase knowledge about the abilities and biases different people have about sexual communication, empowering individuals to make informed, healthy decisions about their sexual and relationship behaviors. Identification of individuals and situations where sexual interest and intents are often misinterpreted will aid in locating at-risk populations, improving sexual assault prevention policies, and inhibiting interference with the right to receive an education free from discrimination through sexual harassment and sexual violence (per Title IX of the Education Amendments of 1972).



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