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Dynamic competition account of men's perceptions of women's sexual interest

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ABSTRACT

This work applies a dynamic competition framework of decision making to the domain of sexual perception, which is linked theoretically and empirically to college men's risk for exhibiting sexual coercion and aggression toward female acquaintances. Within a mouse-tracking paradigm, 152 undergraduate men viewed full-body photographs of women who varied in affect (sexual interest or rejection), clothing style (provocative or conservative), and attractiveness, and decided whether each woman currently felt sexually interested or rejecting. Participants' mouse movements were recorded to capture competition dynamics during online processing (throughout the decisional process), and as an index of the final categorical decision (endpoint of the decisional process). Participants completed a measure of Rape-Supportive Attitudes (RSA), a well-established correlate of male-initiated sexual aggression toward female acquaintances. Mixed-effects analyses revealed greater curvature toward the incorrect response on conceptually incongruent trials (e.g., rejecting and dressed provocatively) than on congruent trials (e.g., rejecting and dressed conservatively). This suggests that the two decision alternatives are simultaneously active and compete continuously over time, consistent with a dynamic competition account. Congruence effects also emerged at the decisional endpoint; accuracy was typically lower when stimulus features were incongruent, rather than congruent. RSA potentiated online congruence effects (intermediate states of behavior) but not offline congruence effects (endpoint states of behavior). In a hierarchical regression analysis, online processing indices accounted for unique variability in RSA above and beyond offline accuracy rates. The process-based account of men's sexual-interest judgments ultimately may point to novel targets for prevention strategies designed to reduce acquaintance-initiated sexual aggression on college campuses.

1. Introduction

Twenty percent of women are estimated to experience an attempted or completed rape by a male acquaintance during college (Fisher, Cullen, & Turner, 2000; Krebs, Lindquist, Warner, Fisher, & Martin, 2007). Numerous factors are associated theoretically and empirically with an increased risk of sexually aggressive behavior and its established correlates, such as Rape-Supportive Attitudes (RSA) that justify and minimize the impact of rape (Abbey, Jacques-Tiura, & LeBreton, 2011; Farris, Treat, Viken, & McFall, 2008b). However, a critical factor is *cognitive*: men's misperception of women's sexual interest (i.e., sexual misperception) (e.g., Abbey et al., 2011; Farris, Treat, Viken, & McFall, 2008a). Sexual misperception early in an interaction (e.g., misperceiving friendliness as sexual interest) might increase risk for later aggression via reduced sensitivity to later non-consent cues or via dismissal of such cues as capricious or "token resistance" (Farris et al., 2008b; Treat, Viken, Farris, & Smith, 2016).

A more basic understanding of men's misperceptions of women's sexual interest may ultimately point to novel ways of targeting and modifying decisional errors. However, it may not be straightforward to apply classic models of cognitive and perceptual judgments to sexual-interest judgments, which are highly multi-dimensional, contextually influenced, and emotionally charged. Prior sexual-perception research has begun to examine this problem from a cognitive perspective using the accuracy of decisions to examine factors like cue weighting (e.g., Treat, Church, & Viken, 2017; Treat, Hinkel, Smith, & Viken, 2016; Treat, Viken et al., 2016). However, this has neglected the fact that such perceptual decision making unfolds over time. Decisional dynamics may offer useful insight into this problem, as estimates of real-time processing can reveal underlying cognitive mechanisms and enhance

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our understanding of real-world decision making in which pressure to act quickly can result in action based on incomplete decisional states.

The current work leverages a dynamic competition/cue-integration framework of decision making to examine an online (i.e., real-time) index of men's processing of women's sexual interest and an offline (i.e., accuracy) index of the end-state of this decisional process to address three questions. First, we ask whether disparate interpretations of a woman's affect (sexually interested and rejecting) are, on average, activated simultaneously and compete dynamically throughout the decisional process of judging a woman's current sexual interest. Second, we assess the extent to which individual differences in decisional dynamics are related to variability in RSA, offering a clinically important extension of these cognitive models. Third, we ask whether online decision dynamics predict individual differences in attitudes *over and above* the decisional outcome of the categorization process. Addressing these questions is essential for evaluating the relevance of dynamic theories and measures of sexual-interest decision making to clinically relevant public-health problems like sexual aggression.

Below, we describe the dynamic competition/cue-integration account that motivated the current work and summarize what is known about men's perceptions of women's nonverbal communication of dating-relevant affect, before presenting the current study and its hypotheses.

1.1. Dynamic competition and multiple-cue integration

Domains like language processing, visual categorization, and decision making require rapid processing of ambiguous inputs. This requires combining many sources of information (Freeman, Ambady, Rule, & Johnson, 2008; Goldstone & Medin, 1994; McClelland & Elman, 1986; McMurray, Horst, & Samuelson, 2012; Spivey, 2007), typically informed by the relative importance of each cue (Ernst & Banks, 2002; Jacobs, 1999; MacDonald, Pearlmutter, & Seidenberg, 1994; Toscano & McMurray, 2010). Although these models were developed for basic cognitive phenomena like speech categorization, this framing has recently been applied to more complex social judgments (e.g., Freeman, Penner, Saperstein, Scheutz, & Ambady, 2011). For example, male judges of a woman's level of sexual interest often rely on multiple nonverbal cues to varying degrees, including the woman's affect (i.e., facial expression and body language), the provocativeness of her clothing, and the level of her normative attractiveness (e.g., Farris, Viken, Treat, & McFall, 2006; Treat, Hinkel et al., 2016; Treat, Viken et al., 2016; Treat et al., 2017).

Beyond the idiographic reliance on various cues lies the issue of the mechanism *underlying* the decisional process. Many models suggest a gradually unfolding competition between available responses. This thinking has been applied to a wide range of domains, including speech, and face perception (Freeman & Johnson, 2016; Freeman et al., 2008; McClelland & Elman, 1986), as well as visual categorization, comparison, and search (Goldstone & Medin, 1994; Spivey, 2007). According to these models, multiple candidate interpretations are activated simultaneously, rather than serially, using bottom-up stimulus cues and often top-down expectations (Freeman & Johnson, 2016; McClelland & Elman, 1986).[1] Although this competition is pronounced for perceptually ambiguous or incomplete inputs, it is also present—at least briefly—for unambiguous inputs. This unfolding competition is resolved over time as less supported candidates are suppressed, until only one candidate remains and the decision is reached. Although this continuous process appears discrete when evaluating only the final judgments (the endpoint of the process), the dynamics leading up to the decisional endpoint may be probabilistic and graded.

Mechanistic accounts agree on the idea that multiple candidates build activation or evidence gradually and in parallel (Ratcliff, 1978; Usher & McClelland, 1986). A crucial area in which they differ is whether preliminary activation states continuously cascade to guide ongoing action.[2] Interactive accounts typically argue for the former, whereas some modular models use a race-like architecture in which candidates build activation independently of one another and action is initiated only when activation of one crosses a threshold. The continuous cascade posited by dynamic competition/cue-integration perspectives may have crucial real-world consequences (Spivey, 2007). In the real-world, there is rarely sufficient time to rely on fully processed stimuli. Thus, partially activated states and partially resolved competition may be the basis of most daily perception and decision-making. Consequently, for decisions about sexual interest, measures of partially resolved or intermediate states of processing may uniquely predict how people behave in dating situations over and above discrete measures of decisional endpoints.

Dynamic competition/cue-integration accounts are often evaluated with online processing measures that quantify competition dynamics over the course of stimulus processing. In the mouse-tracking paradigm (Dshemuchadse, Scherbaum, & Goschke, 2013; Huette & McMurray, 2010; Kieslich & Hilbig, 2014; Spivey, Grosjean, & Knoblich, 2005), participants view or hear a stimulus and move a computer mouse toward one of two response options, typically in the upper left and right corners of the screen. As the participant moves the mouse, the streaming *x, y* coordinates are recorded. These continuous trajectories are influenced by fluctuations in activation of the candidates as decision-making unfolds.

Typically, when the incorrect response is partially active, mouse trajectories "veer" or curve somewhat toward that response along the way to the final correct selection (Fig. 1). This suggests that *both* candidates influence behavior. In this way, mouse trajectories allow investigators to visualize and quantify competition dynamics over the course of decision-making as activation states of potential responses interface continuously with motor programs (Spivey, 2007). In most domains that have been studied, mouse-tracking reveals that motor or action planning does not wait for a final decision before executing a response. Rather, preliminary states (i.e., partial activation) cascade directly to action planning, suggesting a lack of modularity between decision-making and other systems in these domains.

Although dynamic competition frameworks have been around for some time (McClelland & Rumelhart, 1981), they primarily have been applied to domains where simple well-defined inputs are mapped to nearby levels of representation. Recently, these models have been profitably applied to person perception, focusing largely on social category membership (e.g., gender and race) and emotion (e.g., anger vs happiness), and studied using manipulations of perceptual properties (e.g., information in faces, voices, and men's attire; Cloutier, Freeman, & Ambady, 2014; Freeman, 2014; Freeman & Ambady, 2011; Freeman & Johnson, 2016; Freeman, Ambady, Midgley, & Holcomb, 2011; Freeman, Pauker, Apfelbaum, & Ambady, 2010; Freeman et al., 2008; Hehman, Ingbretsen, & Freeman, 2014). For instance, Freeman et al. (2008) used mouse-tracking to assess the cognitive dynamics of gender categorization. Across trials, stimulus features were either conceptually *congruent* (e.g., a male face with short hair) or *incongruent* (e.g., a male face with long hair). On incongruent trials, trajectories veered more toward the incorrect category than on congruent trials, even though the correct response was ultimately selected. This suggests that *male* and *female* categories were activated online by integrating both cues, establishing the interaction of higher-level social expectations (e.g., what

[1] Although we are describing a dynamic competition framework here, to be clear, we are using this term broadly to describe the large class of models featuring simultaneous consideration of multiple response options. This includes models like the drift diffusion model and race models, which do not incorporate inhibition among responses but do incorporate the simultaneous accumulation of evidence for multiple potential responses.

[2] Although we focus here on the parallel consideration and dynamically unfolding activation that are hallmarks of both classes of models, we discuss the distinctions between them in the online supplement (see Supplement S1).