

Research Article

Heterosocial Perceptual Organization

Application of the Choice Model to Sexual Coercion

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ABSTRACT—Luce's (1959, 1963) choice model was used to characterize individual differences in men's perception of women's affect as friendly, sexually interested, sad, or rejecting. Women's clothing styles were associated with differences in the model's parameters. Sensitivity to sadness, rejection, and friendliness declined when women were dressed provocatively, whereas sensitivity to sexual interest increased. Provocative clothing was also associated with an increased bias to assume that positive affect was sexual interest rather than friendliness. Men at risk for perpetrating sexual aggression were less sensitive to women's affect than low-risk men were. They were also more likely than low-risk men to associate provocative clothing with sexual interest, and conservative clothing with friendliness. Results indicate that heterosocial perception may help to predict sexually coercive behavior and may be an important target for intervention.

Sexual bargaining is a dynamic, social process by which potential partners communicate interest or lack of interest in pursuing a sexual relationship with each other (Hirshman & Larson, 1998). Even in the best of circumstances, it can be a confusing process. Vast individual differences in communication styles make the risk of confusion and social embarrassment a possibility, as misinterpreting a potential partner's intent can lead to outcomes such as continuing to pursue someone who is uninterested. Although most failures in interpretation likely lead only to relatively innocuous and easily rectified negative outcomes, in some extreme cases, sexual misinterpretation may lead to more serious and socially problematic behavior, such as sexual coercion or sexual violence.

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A model of sexual-violence risk proposed by Abbey, McAuslan, and Ross (1998) posits a central role for sexual misperception (i.e., perception of sexual interest or sexual attraction in a potential partner when that person has not intended to communicate interest). Normatively, it has been well documented that male college students perceive more female sexual interest than is intended to be conveyed. Whether viewing still images, videos, or live interactions, men tend to perceive women as displaying more sexual interest than female viewers do and also tend to perceive more sexual interest than the female actors intended to display (Abbey, 1982; Abbey & Harnish, 1995; Edmondson & Conger, 1995; Saal, Johnson, & Weber, 1989; Shotland & Craig, 1988). Sexually coercive men may be particularly prone to this “over-perception” of sexual intent (Abbey et al., 1998). Researchers have noted that sexually coercive men may be relatively insensitive to women's negative cues as well and may not respond differentially depending on the nature of women's responses (Lipton, McDonel, & McFall, 1987; McDonel & McFall, 1991). If a man mistakenly perceives a woman as interested in pursuing a sexual relationship, her later refusal may seem arbitrary and hostile. His early misperception may lead the man to interpret the situation as indicating that his partner has deliberately led him on. If this experience leads to anger and frustration, the man may choose to aggress against the source of his frustration, that is, his partner. Thus, relatively distal information-processing deficits early in sexual bargaining could ultimately increase the risk for sexual aggression in a subset of men.

Researchers in the field of sexual aggression between acquaintances often employ self-report measures of sexual misperception, which rely on the validity of introspective access to this core construct (e.g., Abbey, 1987; Rapaport & Burkhart, 1984; Ryan, 2004). More rarely, researchers include external observers' ratings of men's perceptual accuracy (Abbey, Zawacki, & Buck, 2005), which also rely on an untenable assumption that internal perceptual events will be observable to outside coders. Increasingly, clinical investigators are arguing

that translational cognitive-clinical research ought to shift measurement to performance-based measures that provide increased experimental control while decreasing reliance on introspection (Neufeld, Vollick, Carter, Boksmann, & Jetté, 2002; Treat, McFall, Viken, & Kruschke, 2001; Treat et al., 2002). Although self-report will continue to have a role in assessment of some constructs that cannot be assessed otherwise, the dominance of such measures should be questioned when feasible measurement alternatives exist.

The current study explored the relationship between individual differences in sexual perception and risk for perpetration of sexual violence by applying Luce's choice model (1959, 1963), a traditional cognitive science model of perception, which can be used to provide a performance-based assessment of undergraduate men's social perception of women's affect. The model is closely aligned with the more commonly utilized signal detection theory (Green & Swets, 1966). In fact, the parameters, sensitivity and bias, can be interpreted similarly across the two models. Sensitivity is defined as the ability of the perceiver to discriminate one category from another accurately. Bias refers to the perceiver's response preferences (i.e., a tendency to choose one response rather than another). These summaries of choice behavior provide estimates of the perceiver's ability to discriminate two categories (e.g., women's sexual interest vs. friendliness) and the perceiver's relative decision bias (e.g., a tendency to assume women's negative affect is rejection or hostility rather than just sadness or withdrawal). (See Macmillan & Creelman, 2004, for an applied review of the model.)

Using the choice model to analyze heterosocial perception contributes to Abbey's model of sexual violence (Abbey et al., 1998) by more rigorously specifying the underlying perceptual mechanisms that lead to misperception. Prior work has been unable to specify whether men's inaccuracy in decoding women's intent is due to a genuine inability to differentiate affect categories (sensitivity) or to response preferences (bias). Precision of this sort may be important in specifying intervention and prevention targets.

We expected that performance-based measures of heterosocial perception would be related to risk for sexual violence. Current theory within the field of acquaintance rape predicts that high-risk men will make more decoding errors (perceive more sexual intent) than low-risk men. From the perspective of Luce's (1959) choice model, this greater inaccuracy may be produced via two basic mechanisms, reduced sensitivity or differences in decisional bias. From a theory-building perspective, as well as for purposes of designing interventions, it is necessary to analytically differentiate these mechanisms. Thus, we expected that men who are at high risk for perpetrating sexual aggression would be less sensitive to women's affect compared with low-risk men. We also expected that mean sensitivity to affect would decline across all men when women were dressed provocatively (rather than conservatively), but that this decline

would be particularly pronounced among high-risk men. Finally, we expected that low-risk men, compared with high-risk men, would exhibit a less pronounced bias to assume that positive affect is sexual interest rather than friendliness, and that men with a bias to assume that a woman's negative affect cues indicate hostility (rather than sadness or withdrawal) may be at elevated risk for perpetrating sexual aggression.

METHOD

Participants

Undergraduate heterosexual men ($N = 277$) participated in exchange for course credit. Their average age was 19.5 years ($SD = 1.3$), and 87.5% of the sample was White-Caucasian (2.8% were African American, 5.2% were Asian American, 1.4% were Hispanic, 0.4% were Native American, 1.7% identified themselves as "other," and 1.1% did not provide a response). The overwhelming majority of the sample reported having had some dating experience (99.0%) and sexual experience (91.1%; oral or vaginal intercourse).

Materials

Extensive pilot testing was employed to select a set of 280 images of undergraduate women that varied by three factors. The target categories were sexually interested, friendly, rejecting, and sad. As shown in Table 1, these categories were selected because they represent a cross of two theoretically relevant factors: valence of affect (positive vs. negative) and relevance to sexual bargaining (directly vs. indirectly related). For example, targets judged to be friendly are an important foil to targets judged to be sexually interested, as both present positive displays, but only one provides the perceiver with diagnostic information about whether the woman is interested in pursuing a romantic relationship at that moment. In addition, clothing style (provocative or conservative) was varied.

The original stimulus set included 1,127 photographs of undergraduate women displaying a variety of emotions in a number of clothing styles. A sample of 497 undergraduate men rated these photographs on scales for friendliness, sexual interest, sadness, rejection, and provocative dress. Photographs rated above the median on each affect scale were retained.

TABLE 1
The Four Affect Categories Displayed by Targets, as Defined by Two Factors

Affect valence	Relevance to sexual bargaining	
	Indirect	Direct
Positive	Friendly	Sexually interested
Negative	Sad	Rejecting

A new sample of undergraduates (80 men and 80 women) categorized each of the photographs thus selected into one of four categories: friendly, sexually interested, sad, or rejecting. A photograph was retained if the majority of men and women categorized the picture into the same affect group. A majority criterion, rather than a strong consensus criterion, was used in order to ensure variability within each category, as variability is required to model theoretically relevant perception parameters. Finally, 70 photographs for each affect category were selected randomly (provided that one half of the selected photographs fell below the midpoint for provocative dress). Note that because models were instructed to select clothing from their own wardrobes, variance along this continuum is representative of the range of clothing styles a college student would observe in the population. That is, “conservative clothing” would likely be jeans and a sweatshirt, whereas “provocative clothing” would likely be a short skirt and a tight or revealing top.

Measures

Rape Myth Acceptance (RMA) Scale

The 13-item RMA scale measures beliefs that rape is justified and that women are responsible for victimization ($\alpha = .88$; Burt, 1980). Total RMA score has been found to predict self-reported perpetration of sexual coercion or aggression (Hersh & Gray-Little, 1998; Koss & Dinero, 1988; Meuhlenhard & Linton, 1987).

Sexual Experiences Survey (SES)

The SES is a behaviorally specific self-report measure of sexual coercion and aggression (Koss, Gidycz, & Wisniewski, 1987) with reasonable evidence for reliability and validity (Koss & Gidycz, 1985; Koss et al., 1987). It is positively skewed; the vast majority of respondents earn a score of zero (no coercion). Therefore, we scored the SES dichotomously—separating the sample into men who responded negatively to all items (non-coercive) and men who responded affirmatively to one or more items (sexually coercive or aggressive).

Procedure

Prior to beginning the identification task, participants were randomly assigned to one of three stimulus presentation times (500, 1,000, or 3,000 ms). Presentation times were selected to range from a duration in which it would be challenging to encode all socially relevant information to a duration that would provide adequate time for encoding. While seated in front of a computer screen, participants viewed images of women, each remaining on the screen for the duration of the assigned presentation time. After viewing each image, subjects selected the category that best represented the target: friendly, sexually interested, sad, or rejecting. Target images were presented in four blocks of 70 randomly ordered photographs. Following the identification

task, participants completed a series of computer-administered questionnaires, which included the RMA Scale and the SES.¹

Analyses

The parameters of Luce’s (1959) choice model, sensitivity and bias, were computed individually for each participant (see Luce, 1959, 1963; Macmillan & Creelman, 2004, pp. 247, 250). In this model, sensitivity, $\ln(\alpha)$, equals zero when the participant is unable to perceive the category structure and increases positively as sensitivity improves. Given the size of the stimulus set, near-perfect sensitivity would correspond to a value of 4.63. The signal detection sensitivity index, d' , corresponds to $\ln(\alpha)/0.81$ (MacMillan & Creelman, 2004).

For bias analyses, we computed positive-affect bias, $\ln(b_f/b_{si})$, the ratio of the bias to respond that a target is friendly over the bias to respond that the target is sexually interested, and negative-affect bias, $\ln(b_{sd}/b_{rj})$, the ratio of the bias to respond that a target is sad over the bias to respond that the target is rejecting. A positive ratio indicates a greater bias to label targets as friendly or sad, and a negative ratio indicates a greater bias to label targets as sexually interested or rejecting. The absolute value of the bias estimate increases as bias toward one category increases. For this stimulus set, almost exclusive reliance on one category response would produce a bias of ± 6.55 .

The association between the choice model parameters for social perception (sensitivity and bias) and the two individual differences measures was analyzed via a general linear model (GLM) approach in order to include a continuous scale score and a dichotomous score simultaneously as predictors. RMA scores were centered prior to entry. Two models are reported here. The first predicted sensitivity estimates. Provocativeness of the target’s clothing style, valence of the target’s affect, sexual-bargaining relevance of the target’s affect, and presentation time were included as independent variables. The final independent variables were the individual difference scores. In the bias model, clothing style, presentation time, and the individual difference scores served as predictors of the two bias scores. The hypotheses of interest involve the main effects of the experimentally manipulated and the individual difference variables, but also—and more important—the higher-level interactions between the individual difference scores and the experimentally manipulated variables.

RESULTS

Sensitivity

Experimental Variables

The GLM model predicting sensitivity revealed significant main effects for affect valence, sexual-bargaining relevance, and

¹For the sake of brevity, we report on only two individual difference variables associated with risk for sexual aggression. Results of analyses exploring the association between other predictors of sexual-aggression risk and choice theory parameters are available from the first author.

TABLE 2

Mean Sensitivity Estimates, $\ln(\alpha)$, by Affect Category and Clothing Style

Affect	Clothing style	
	Conservative	Provocative
Friendly***	2.14 (0.54)	2.07 (0.54)
Sexually interested***	0.87 (0.88)	1.36 (0.61)
Sad***	1.64 (0.51)	1.24 (0.58)
Rejecting***	1.34 (0.60)	1.22 (0.63)

Note. Standard deviations are in parentheses.

*** $p < .001$.

clothing style, $F_s(1, 268) = 70.91, 396.07, \text{ and } 5.19$, respectively, $p_s < .05$, η_p^2 s = .209, .596, and .02 respectively. Participants' sensitivity declined when target women displayed negative affect ($M = 1.36$) as opposed to positive affect ($M = 1.61$), when affect was directly relevant to sexual bargaining ($M = 1.20$) rather than indirectly relevant ($M = 1.77$), and when targets were dressed provocatively ($M = 1.47$) rather than conservatively ($M = 1.49$). These main effects were qualified by a three-way interaction among these variables, $F(2, 268) = 34.34$, $p < .001$, $\eta_p^2 = .114$. Given that affect valence and sexual-bargaining relevance were both included in the interaction, follow-up univariate analyses of clothing style were pursued for each affect category individually. The effect of clothing style varied across affect categories (see Table 2). For friendly, sad, and rejecting targets, sensitivity declined when targets were dressed provocatively, $F_s(1, 268) = 12.89, 284.53, \text{ and } 28.868$, $p_s < .001$, η_p^2 s = .046, .515, and .097. However, for sexually interested targets, sensitivity improved when targets were dressed provocatively, $F(1, 268) = 204.54$, $p < .001$, $\eta_p^2 = .433$.

Individual Difference Variables

There was a significant main effect for RMA, $F(1, 268) = 22.49$, $p < .001$, $\eta_p^2 = .077$. Participants who more strongly endorsed rape myths were also less sensitive to women's affect, $r(277) = -.31$, $p < .001$. A four-way interaction among RMA, affect valence, sexual-bargaining relevance, and clothing style moderated this effect, $F(1, 268) = 12.03$, $p < .001$, $\eta_p^2 = .043$. Follow-up analyses of RMA-by-clothing-style interactions within each target category were pursued. The interaction was significant for sexually interested targets, $F(1, 268) = 5.55$, $p < .05$, $\eta_p^2 = .020$, and for rejecting targets, $F(1, 268) = 9.51$, $p < .01$, $\eta_p^2 = .034$. As illustrated in the top panel of Figure 1, the decline in sensitivity to sexual interest associated with strong endorsement of rape myths was more pronounced when women were dressed conservatively (i.e., incongruently with affect) than when they were dressed provocatively. Similarly, the bottom panel of Figure 1 illustrates that the decline in sensitivity to rejection associated with increasing endorsement of rape myths was stronger when women were dressed incongruently with their affective display (in this case, dressed provocatively while

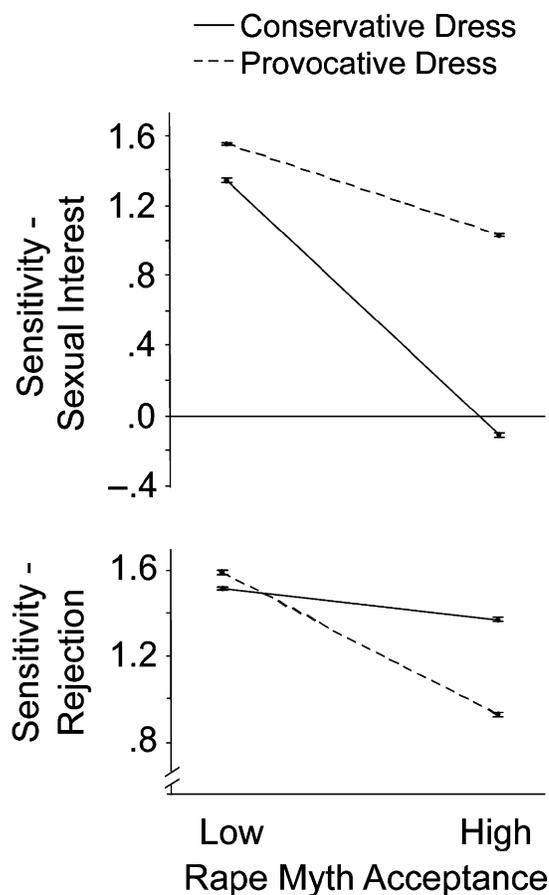


Fig. 1. Mean sensitivity, $\ln(\alpha)$, to sexual interest (top panel) and rejection (bottom panel) as a function of Rape Myth Acceptance score and clothing style. Error bars indicate confidence intervals computed according to recommendations by Masson and Loftus (2003) for between- and within-subjects designs.

displaying rejection), rather than dressed congruently with their affective display.

Sexual-coercion history did not predict sensitivity directly, but there was a significant interaction among sexual-coercion history, clothing style, and presentation time, $F(2, 268) = 3.99$, $p < .05$, $\eta_p^2 = .029$. The difference among levels of the three factors was most prominent when participants were required to make social judgments quickly. When presentation time was short (500 ms), sexually coercive men were significantly less sensitive to women's affect ($M = 1.35$) than were noncoercive men ($M = 1.52$; Tukey's HSD, $p < .05$). In addition, with short presentation times and among sexually coercive men only, provocative clothing led to a decline in sensitivity ($M = 1.28$) relative to conservative clothing ($M = 1.37$, $p < .05$). When presentation time was moderate (1,000 ms), sexually coercive men ($M = 1.43$) continued to be less sensitive to women's affect than noncoercive men ($M = 1.58$, $p < .05$), but clothing style no longer had a significant effect. Finally, when presentation time was long (3,000 ms), sexual-coercion status and clothing style were no longer significant predictors of overall sensitivity.

TABLE 3
Mean Bias Estimates by Clothing Style

Bias	Clothing style	
	Conservative	Provocative
Positive affect: $\ln(b_{fr}/b_{si})^{a***}$	1.30 (0.83)	0.70 (0.89)
Negative affect: $\ln(b_{sd}/b_{rj})^b$	-0.08 (0.76)	-0.11 (0.71)

Note. Standard deviations are in parentheses.

^aPositive-affect bias was calculated as the ratio of the bias to respond that a target displaying positive affect was friendly over the bias to respond that the target was sexually interested. ^bNegative-affect bias was calculated as the ratio of the bias to respond that a target displaying negative affect was sad over the bias to respond that the target was rejecting.

*** $p < .001$.

Bias

Experimental Variables

A separate GLM model was used to predict decisional bias. This model revealed a significant main effect for clothing style, $F(2, 267) = 135.98, p < .001, \eta_p^2 = .505$. Follow-up univariate tests revealed that this effect emerged only for positive-affect bias, $F(1, 268) = 270.07, p < .001, \eta_p^2 = .502$. As shown in the first row of Table 3, participants showed a greater tendency to view positive affect as friendliness when the woman was dressed conservatively rather than provocatively. Presentation time did not directly predict bias, but there was an interaction between clothing style and presentation time, $F(4, 536) = 2.48, p < .05, \eta_p^2 = .018$. Follow-up univariate analyses showed that this interaction was significant only for positive-affect bias, $F(2, 268) = 3.39, p < .05, \eta_p^2 = .025$. The difference between positive-affect bias for targets wearing conservative clothing and those wearing provocative clothing was moderately increased at the short and long presentation times. Relative to when the women were dressed provocatively, when they were dressed conservatively, the tendency to assume that positive affect was friendliness increased by 0.69 in the 500-ms presentation condition, by only 0.46 in the 1,000-ms presentation condition, and by 0.66 in the 3,000-ms presentation condition.

Individual Difference Variables

RMA did not have a significant main effect in predicting bias, but an interaction between RMA and clothing style appeared, $F(2, 267) = 5.79, p < .01, \eta_p^2 = .042$. This interaction was significant for both positive-affect bias, $F(1, 268) = 7.97, p < .01, \eta_p^2 = .029$, and negative-affect bias, $F(1, 268) = 4.04, p < .05, \eta_p^2 = .015$. As shown in the top panel of Figure 2, as men's endorsement of rape myths increased, they became increasingly likely to assume that conservatively dressed women were friendly and, to a lesser extent, that provocatively dressed women were sexually interested. The bottom panel of Figure 2 depicts an association between increasing endorsement of rape myths and an increasing tendency to assume that women displaying negative affect are communicating rejection (rather than

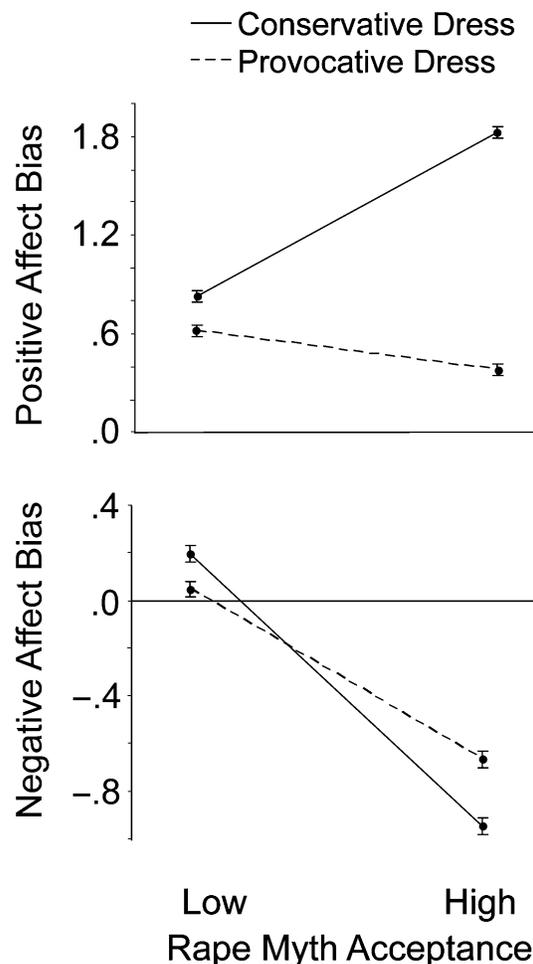


Fig. 2. Mean estimates for positive-affect bias, $\ln(b_{fr}/b_{si})$ (top panel), and negative-affect bias, $\ln(b_{sd}/b_{rj})$ (bottom panel), as a function of Rape Myth Acceptance score and clothing style. Error bars indicate confidence intervals computed according to recommendations by Masson and Loftus (2003) for between- and within-subjects designs.

sadness). This effect was particularly pronounced when women were dressed conservatively. Sexual-coercion history was not related to bias estimates.

DISCUSSION

Our data suggest that men's attitudes about rape—a risk factor for the behavior (Hersh & Gray-Little, 1998; Koss & Dinero, 1988; Meuhlenhard & Linton, 1987)—predict their perception of women's affect cues. Men who believed that rape is justifiable and who blamed women for victimization were less sensitive to women's affect than were men who did not endorse these attitudes. They had particular difficulty decoding rejection when women were dressed provocatively and sexual interest when women were dressed conservatively. The inability to decode sexual interest when women are dressed incongruently with their affect increases the probability of error. Limited sensitivity to rejection when clothing cues are distracting may be problematic when it is

necessary to focus on nonconsent cues. It is a concerning convergence of risk factors that the men who held attitudes that may increase the likelihood of perpetrating a sexual crime were the same men who were more likely to confuse platonic friendliness with sexual interest, or genuine sadness with hostile rejection. For these men, initially mistaking a woman's friendliness for sexual interest could snowball into a situation in which her later nonconsent is seen as hostile and arbitrary, and her withdrawal is considered rejection. Negative attitudes toward women and beliefs that rape victims deserve to be assaulted may lead to feelings of justification for sexual assault in this particular situation. This scenario is certainly speculative at this time, but is not inconsistent with our preliminary results.

Men's self-reported history of sexual coercion was also related to sensitivity differences. The observed reduction in sensitivity among sexually coercive men compared with noncoercive men was greatest at the shortest presentation time and diminished with longer presentation times. This result suggests that sexually aggressive men may have particular difficulty with snap judgments, but may be relatively unimpaired when deliberation time is adequate. In addition, it appears that provocative clothing was particularly distracting to aggressive men when judgments had to be made quickly. Unfortunately, the social situations in which decisions about interest and noninterest must be made are often the same situations in which appropriate attire is likely to be revealing.

Independently of individual differences in sexual-coercion risk, men's sensitivity declined when the women displayed negative affect and affect relevant to sexual bargaining, and when they were dressed provocatively. With respect to clothing style, it is as if attention were redirected from the diagnostic elements of the image (e.g., facial affect and posture) to less diagnostic elements when clothing was revealing or tight fitting, leading to a decline in discrimination of affect. However, in one instance, provocative clothing was associated with increased sensitivity. As might be expected, sensitivity was greater when clothing style and affect were congruent (provocatively dressed, sexually interested women) than when they were incongruent (conservatively dressed, sexually interested women). Although clothing style did not influence bias to assume that negative affect was sadness rather than rejection, it did influence positive-affect bias. Men's relative bias to assume that the target was friendly rather than sexually interested declined when they viewed provocatively dressed targets; that is, they became more willing to categorize the target as sexually interested. This result is consistent with prior research demonstrating that men are more likely to infer sexual intent in women who are dressed provocatively rather than conservatively (Abbey, Cozzarelli, McLaughlin, & Harnish, 1987; Cahoon & Edmonds, 1989), and begins to pinpoint the source of this normative inaccuracy as being related to both a general difficulty in distinguishing forms of positive, impelling affect and a general, perhaps implicit, assumption that provocative dress is likely to be associated with sexual intent.

We had speculated that high-risk men may have lenient criteria for perceiving sexual interest and rejection, and that these relative biases might instigate a chain of events that lead to sexual aggression for some men. This hypothesis was partially supported, but not reliably demonstrated across measures. Men who indicated that they believed women are generally responsible for rape were more biased than other men to assume that women's affect displays were congruent with their clothing style (e.g., conservatively dressed women are just friendly rather than sexually interested). However, there was no relation between self-reported sexual-coercion history and response tendencies. Men at risk for sexual aggression demonstrated decreased sensitivity more reliably than a criterion shift. These results are important in that they begin to specify the form of heterosocial inaccuracy among high-risk men.

The current study demonstrates that models of simple perception, such as Luce's (1959, 1963) choice model, provide powerful measurement alternatives that directly assess socially relevant perceptual processes. We were able to demonstrate that choice model parameters, as measured in the current context, have sufficient variance to allow theoretically relevant individual differences to emerge. These findings provide further encouragement to ongoing efforts to increase cross-disciplinary ties and highlight the utility of cognitive psychologists' computational models for examining questions about individual differences in cognitive processing (e.g., Busemeyer & Stout, 2002; Treat et al., 2001; Viken, Treat, Nosofsky, McFall, & Palmeri, 2002).

For many years, sexual-violence researchers have pointed to deficits in decoding processes as possible precursors to sexually coercive behavior (Abbey et al., 1998; McDonel & McFall, 1991). Misperception of sexual interest, in particular, may lead a man to feel frustrated when his partner unexpectedly refuses further intimacy. Evidence from adolescent populations suggests that this process may be particularly dangerous, as nearly two thirds of the adolescents surveyed indicated that forcing sex is acceptable if a man believes a woman has led him on (Goodchilds & Zellman, 1984). The current study demonstrated that correlates of sexual coercion indeed are associated with a decline in sensitivity to women's affect, suggesting that heterosocial decoding skills may be an important target for sexual-assault prevention programs. The current "one size fits all" programs for sexual-assault prevention with men have proven to be ineffective in altering attitudes among high-risk men (Stephens & George, 2004). Perhaps by targeting specific deficits among those men most at risk, the efficacy of prevention programs will be improved, and potential assaults will be prevented.

Acknowledgments—This research was supported by grants from the National Institute of Mental Health (T32-MH17146) and from the National Institute of Alcohol and Alcohol Abuse (F31-AA016055).

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(RECEIVED 7/15/05; REVISION ACCEPTED 2/6/06;
FINAL MATERIALS RECEIVED 2/13/06)