The disengagement of attentive resources from task-irrelevant cues to sexual and emotional
infidelity
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Abstract

The present study tests two predictions derived from the evolutionary view of jealousy. (1)

For men the disengagement of attentive resources from task-irrelevant cues to sexual infidelity is more difficult than from neutral or emotional infidelity cues. Conversely, for women the disengagement of attentive resources from task-irrelevant cues to emotional infidelity is more difficult than from neutral or sexual infidelity cues. (2) These difficulties are especially pronounced in participants currently involved in a committed romantic relationship. In each trial either an affectively neutral, an emotional infidelity or sexual infidelity distractor was simultaneously presented with a target sentence. The last trial was followed by a recall test for the targets and distractors. The results confirmed both predictions. Implications and limitations of the present study are discussed and suggestions for future research are provided.

Key words: Jealousy; evolved psychological mechanism; sex differences; cues to infidelity; disengagement of attentive resources; context sensitivity

Evolutionary psychologists view jealousy as a complex psychological mechanism that evolved because it recurrently solved an essential problem of individual reproduction in our evolutionary history: Infidelity in reproductive relationships (Daly, Wilson, & Weghorst, 1982; Symons, 1979). A distinctive feature of the evolutionary view is the assumption of sex-specific evolved jealousy mechanisms because different infidelity types have recurrently threatened male and female reproductive success. Specifically, a woman's sexual infidelity deprives her mate of a reproductive opportunity and may burden him with years of investment in a genetically unrelated child. In contrast, a man's sexual infidelity does not burden his mate with unrelated children, but he may divert resources from his mate's progeny. This resource threat may be signaled by his level of emotional attachment to another female. As a consequence, men's jealousy mechanism presumably aims at the prevention of the (re-) occurrence of a mate's sexual infidelity, in women, it presumably aims at the prevention of the (re-) occurrence of a mate's emotional infidelity.

To achieve this goal, the cognitive aspect of men's and women's jealousy mechanisms needs to be geared to the detection and the preferential processing of cues signaling the adaptively primary infidelity type (i.e., female sexual and male emotional infidelity). Moreover, because most cues to infidelity do not unambiguously disclose whether emotional or sexual infidelity has already occurred or might occur and because these cues are frequently spread over time, decisions about the potential occurrence of sexual or emotional infidelity are typically based not on a single but rather on several infidelity cues. This, however, requires that these cues are preferentially attended to, processed, stored and available for retrieval from memory in order to be able to make such decisions.

The studies concerned with sex-differences in the cognitive processing of infidelity cues consistently supported this assumption with respect to various cognitive processes (Schützwohl, 2004; 2005; 2006; Schützwohl & Koch, 2004). To illustrate, Schützwohl (2006, Study 1) found that men led to suspect a mate's infidelity actively requested more information about sexual

aspects of the infidelity than women. Conversely, women requested more information concerning the emotional aspect of the suspected infidelity than men. Furthermore, men were significantly faster than women in deciding whether infidelity cues would elicit either a first pang of jealousy or intolerable jealousy if these cues were more diagnostic of sexual jealousy. For cues more diagnostic of emotional infidelity, women made this decision significantly more rapidly than men (Schützwohl, 2005).

Schützwohl and Koch (2004) reported that men preferentially recalled cues to sexual infidelity whereas women preferentially recalled cues to emotional infidelity. This preferential recall was significant for both men and women only if these cues were personally more relevant (i.e., if they referred to one's own partner) but not if they were personally less relevant (i.e., if they concerned an unknown member of the opposite sex). The finding that infidelity cues were preferentially recalled only if they (a) signaled the adaptively primary infidelity type and (b) were personally relevant suggests that the functioning of men's and women's jealousy mechanism is both input-specific (i.e., was not observed for neutral cues and cues signaling the adaptively secondary infidelity type) and person-specific (i.e., was not observed when the cues were personally irrelevant).

Objectives of the present the study

The main goal of the present study was to further explore the functioning of the jealousy mechanism with respect to a yet unexamined process. This process concerns men's and women's allocation of attentive resources to infidelity cues. The evolutionary view of jealousy and the evidence mentioned above suggest that men and women preferentially attend to cues to the adaptively primary infidelity type if they are personally relevant. Preferential attention can be reflected in one or in each of the following sub-processes: Cues to the adaptively primary infidelity type could preferentially capture or preferentially hold attentive resources or the disengagement of attentive resources from cues to the primary infidelity type could be especially aggravated.

Although it appears reasonable to assume that the jealousy mechanism affects each of these subprocesses, the focus of the present study is on the disengagement of attentive resources. Specifically, the disengagement of attentive resources from task-irrelevant cues to the adaptively primary infidelity type is predicted to be aggravated relative to cues to the adaptively secondary infidelity type or affectively neutral cues. Additionally, these difficulties should be more pronounced if the infidelity cues are personally relevant. In the present study, cues were considered as personal relevant for participants currently involved in a committed romantic relationship (Buss, Larsen, Westen, & Semmelroth, 1992; Sagarin, Becker, Guadagno, Nicastle, & Millevoi, 2003).

To achieve these goals, in each of a series of 18 trials two sentences appeared in close spatial proximity on a computer screen with the second sentence appearing with a short time lag. The first, task-irrelevant distractor sentence was either also affectively neutral, a cue more diagnostic of emotional infidelity, or a cue more diagnostic of sexual infidelity. The second, to-be-remembered target sentence was always affectively neutral. Following common practice in attention research presenting targets and distractors (e.g., Fox, Russo, Bowles, & Dutton, 2001), the participants were instructed to only attend to and memorize the second sentence for an ensuing memory test. Immediately after the last trial, the participants were asked to note all target sentences they could remember. Only after the completion of the recall of target sentences were they instructed to write down as many of the distractor sentences as possible.

The procedure of the present study allows testing the following new predictions derived from the evolutionary view of jealousy:

- (1a) Men's recall is impaired for target sentences paired with sexual infidelity distractors.
 - (1b) Men's recall is enhanced for sexual infidelity distractors.

- (2a) Women's recall is impaired for target sentences paired with emotional infidelity distractors.
 - (2b) Women's recall is enhanced for emotional infidelity distractors.
- (3) These effects are especially pronounced in participants currently involved in a committed romantic relationship.

These predictions are based on the following assumptions: Irrespective of their content, the distractor sentences initially involuntarily capture the participants' attention and will be processed because of their short head start, their close spatial proximity to the target sentences and the automaticity of reading (e.g., Stroop, 1935). The appearance of the target sentences serves as a signal to relocate the attentive resources away from the distractors and towards the target. However, because of their sex-specific relevance, the necessary disengagement of the attentive resources from distractors signaling the adaptively primary infidelity is more difficult than from any of the other distractors: This, in turn, entails that in trials with distractors signaling the adaptively primary infidelity type, distractors receive more and targets receive less attentive resources than in the other trials, thus enhancing memory for these distractors and simultaneously impairing recall for the pertinent targets. Because the cues to the adaptively primary infidelity type are far more relevant for participants with than for those without a current romantic partner, the disengagement of attentive resources from cues to the adaptively primary infidelity type is especially aggravated in participants currently involved in a romantic relationship.

Method

Participants

Participants were 80 students (39 men, 41 women) of various disciplines at the University of Bielefeld. Their age ranged from 19 to 39 years (M = 24.0; SD = 3.7). They were individually approached by the experimenter in the public areas of the University. The

participants were informed at the outset that after the completion of the study two of them could win 40€ (about 50\$) — each drawn by lot.

Apparatus

The experiment was controlled by an IBM compatible microcomputer connected to a 17" computer monitor. Experimental Runtime Systems (BeriSoft Corporation) was used for event scheduling.

Procedure

The participants were tested individually in a dimly lit laboratory room. The participants first completed a questionnaire comprising five questions relating to a current romantic relationship (e.g., whether they were currently involved in a romantic relationship; and if applicable: since when; common interests etc.). Subsequently, they were informed that in each trial of the following memory test two sentences would be presented on the screen for a short duration with the second sentence appearing with a time lag. Furthermore, they were instructed to only attend to and memorize the second sentence for a recall test immediately following the last trial. In the color distractor condition, each distractor sentence was presented in a different color whereas the target sentences were consistently displayed in white against a black background. In the white distractor condition, the distractor sentences were always white and the target sentences varied in color. The reason for presenting one sentence in white and the other in color was to facilitate the discrimination between distractor and target sentences. The reason for changing the color in each trial was to keep attention constant across trials.

Each trial started with the presentation of a white fixation cross at the centre of the screen for 500 ms. Subsequently, the screen remained black for 1,000 ms. The distractor sentence was presented slightly above and the target sentence slightly below the centre of the screen. The time lag between the distractor and the target sentence was 1,000 ms. The

distance between the two sentences was 3 mm. Both sentences disappeared simultaneously 3,500 ms after the appearance of the target sentence. Thereafter, the screen again remained black for 1,500 ms until the presentation of a fixation cross announced the next trial. The font size was fixed at 12. Each sentence occupied one row. The sequence of events in a given trial is illustrated in Figure 1.

Insert Figure 1 about here

Immediately after the last trial, the participants were asked to note as many of the target sentences as possible on lined paper. They were told that it is not necessary to recall the sentences literally but only their gist. After the completion of the first memory task, the participants were told that the main purpose of the study was to find out whether they were able to recall the distractor sentences. Accordingly, they were asked to note the distractor sentences on separate lined paper. During the memory test the participants were alone in the laboratory room.

Construction of the stimulus set

The experiment consisted of 18 trials. The target sentence was always affectively neutral (e.g., "The gas station is at the other side of the street"). Among the 18 distractor sentences, six were also affectively neutral; six were cues more diagnostic of emotional infidelity, and six were cues more diagnostic of sexual infidelity. The cues to infidelity were validated in a study by Shackelford and Buss (1997) and were successfully employed in the studies by Schützwohl (2005) and Schützwohl and Koch (2004). The cues are provided in the appendix. For each participant, a random combination of the 18 target and 18 distractor sentences was created by the computer program. Additionally, the color of the respective sentences was also randomly varied among 18 different colors. Each color was presented only once for each participant. Finally, the sequence of the presentation of the sentences also varied randomly.

Design

The experiment consisted of a 2 (participants' sex) x 2 (distractor type: white vs. color sentences) x 3 (distractor content: neutral vs. sexual infidelity vs. emotional infidelity) factorial design with sex and distractor type as the between-subjects factors and distractor content as the within-subjects factor. An approximately equal number of men and women were randomly assigned to the two distractor-type groups.

Results

One rater who was naïve with respect to the experiment and the hypotheses and the experimenter classified all recall protocols for recall of the target and distractor sentences. Recall protocols did not reveal the participant's relationship status and distractor-type group. A sentence was classified as having been recalled if the gist was recognizable. The two raters agreed in 97% of the classifications of recalled sentences. The following analyses are based on the classifications of the naïve rater.

Thirteen men and 14 women reported no current romantic relationship and 26 men and 27 women answered in the affirmative. A five-way analyses of variance (ANOVA) with participants' sex, current relationship status (with vs. without partner) and distractor type (white vs. color) as the between-subjects factors and recall of stimulus type (targets vs. distractors) and distractor content (neutral, emotional infidelity and sexual infidelity) as the two within-subjects factors revealed no significant main effects for distractor type nor significant interactions including this factor, Fs < 2.1, ps > .12. This factor is hence ignored in the following analyses.

According to the hypotheses, recall performance for distractors and targets were analyzed separately for men and women. Men's and women's mean recall performance for neutral, emotional infidelity and sexual infidelity distractors and the pertinent paired targets as

a function of the current romantic relationship status are presented in Table 1 and illustrated in Figures 2 and 3, respectively.

Insert Table 1 about here

Men's recall performance

A three-way ANOVA with current relationship status as the between-subjects factor and men's recall of stimulus type (targets vs. distractors) and distractor content (neutral, emotional infidelity and sexual infidelity) as the within-subjects factors yielded a significant main effect of the within-subjects factor stimulus type, F(1, 37) = 53.97, p < .001, partial eta² = .593, and a significant interaction between current relationship status and distractor content, F(2, 74) = 3.92, p = .024, partial eta² = .096. More importantly, however, the three-way interaction was also significant, F(2, 74) = 3.79, p = .027, partial eta² = .093. The remaining main effects and interactions were not significant, F(3, 74) = 3.79, F(3, 74) =

The significant three-way interaction was further analyzed by comparing separately for men with and without current romantic relationship the recall of the targets paired with the three distractor contents (Prediction 1a) and the recall of the distractors (Prediction 1b).

Additionally, as an indicator of the trade-off between the attention for targets and distractors, the recall of targets was compared with recall of the distractors separately for the three distractor contents.

Recall of targets. Post-hoc contrasts for repeated measures (p < .05) revealed that as predicted, men with a romantic partner recalled significantly fewer targets paired with sexual infidelity distractors than targets paired with either neutral or emotional infidelity distractors (1.00 vs. 1.54 and 1.92, respectively). In contrast, the recall of targets of men without a romantic partner was not differentially affected by the different distractor contents (cf. Table 1).

Recall of distractors. Men with a romantic partner recalled significantly more sexual infidelity than neutral distractors (0.69 vs. 0.19). Their recall of emotional infidelity distractors was marginally significantly better than of neutral distractors (0.54 vs. 0.19) and did not significantly differ from recall of sexual infidelity distractors (0.54 vs. 0.69). In contrast, the recall of distractors of men without a current romantic partner was not differentially affected by the distractor content (0.08, 0.00 and 0.31, for neutral, emotional and sexual infidelity distractors; see also see Figure 2).

Recall of targets versus distractors. Men with a romantic partner recalled significantly more targets than distractors if they were paired with neutral and emotional infidelity distractors, ts(25) > 3.89, $ps \le .001$, ds > 1.06 (see Table 1 and Figure 2). However, recall for targets paired with sexual infidelity distractors failed to significantly differ from recall of the pertinent distractors, t(25) = 1.03, p > .30. Men without a romantic partner recalled significantly more targets than distractors, irrespective of the content of the respective distractors, ts(12) > 4.24; ps = .001, ds > 1.66 (see Table 1 and Figure 2).

A three-way ANOVA with current relationship status as the between-subjects factor and women's recall of stimulus type (targets vs. distractors) and distractor content (neutral, emotional infidelity and sexual infidelity) as the within-subjects factors yielded significant main effects of the within-subjects factors stimulus type, F(1, 39) = 39.68, p < .001, partial eta² = .504, and distractor content, F(2, 78) = 4.24, p = .018, partial eta² = .098. Additionally, the significant interaction between stimulus type and distractor content, F(2, 78) = 4.63, p = .013, partial eta² = .106, was modified by the significant three-way interaction, F(2, 78) = 5.33, p = .007, partial eta² = .120. The remaining main effect and interactions were not significant, Fs < 1.2, ps > .29.

The significant three-way interaction was further analyzed by comparing separately for women with and without a current romantic relationship the recall of the targets paired with the three distractor contents (Prediction 2a) and the recall of the distractors (Prediction 2b). Additionally, as an indicator of the trade-off between the attention for targets and distractors, the recall of targets was compared with recall of the distractors separately for the three distractor contents.

Recall of targets. As predicted, women with a romantic partner recalled significantly fewer targets paired with emotional infidelity distractors than targets paired with neutral distractors (1.37 vs. 1.89; one-tailed). The recall of targets paired with sexual infidelity distractors (1.63) did not significantly differ from the recall of the other target sentences. As for men, the recall of targets of women without a romantic partner was not differentially affected by the different distractor contents (cf. Table 1).

Recall of distractors. Supporting the predictions, women with a romantic partner recalled significantly more emotional infidelity distractors than neutral and sexual (one-tailed) infidelity distractors (1.19 vs. 0.37 and 0.81, respectively). They also recalled significantly more sexual than neutral distractors. In contrast, women without romantic partner unexpectedly recalled more sexual infidelity distractors than neutral and emotional infidelity distractors (0.71 vs. 0.00 and 0.29, respectively), with no significant difference between the recall of the latter distractors.

Recall of targets versus distractors. Women with a romantic partner recalled significantly more targets than distractors if the targets were paired with neutral and sexual infidelity distractors, ts(26) > 2.78, $ps \le .01$, ds > .79. The recall for targets paired with emotional infidelity distractors, however, clearly failed to significantly differ from recall of the pertinent distractors, t(26) = 0.51, p > .60 (see Table 1 and Figure 3). Again in striking contrast, women without a romantic partner recalled highly significantly more targets than

distractors for emotional infidelity and neutral distractors, $\underline{t}s(13) > 4.30$; $\underline{p}s = .001 \, ds > .80$. Unexpectedly, their recall for targets and distractors did not significantly differ if targets were paired with sexual infidelity distractors, t(13) = 1.63, p = .13 (see Table 1 and Figure 3).

Discussion

Supporting the predictions, men and women currently involved in a romantic relationship failed to recall more targets than distractors only if the targets were paired with the adaptively primary infidelity distractors, but not if they were paired with either the adaptively secondary infidelity or neutral distractors. This failure to recall more targets than adaptively primary distractors is primarily attributable to a decrease in the recall of the targets as well as an increase in the recall of the distractors signaling the adaptively primary infidelity type, especially relative to the recall of targets paired with neutral distractors. In striking contrast, men and women not currently involved in a romantic relationship consistently recalled more targets irrespective of the distractor content with one exception. This exception concerns women without romantic partner who unexpectedly recalled more distractors signaling the adaptively secondary infidelity type than neutral distractors and distractors signaling the adaptively primary infidelity type. With this exception in mind, men and women without romantic partner obviously had no difficulties to disengage their attentive resources from the distractors and relocate them rapidly to the targets, irrespective of the distractor content. Hence, the present results confirm previous evidence that the functioning of men's and women's jealousy mechanism is both input- and person-specific. More importantly, the extends this evidence by suggesting that the jealousy mechanism is a highly vigilant monitoring device that operates already at very early and presumably involuntary stages of information processing and that is especially sensitive (a) to cues signaling the adaptively primary infidelity type (b) in individuals who have every reason to worry about these reproductive threats (i.e., individuals currently involved in a romantic relationship).

The assumption that attentive processes in jealousy are controlled by specific input and personal characteristics is corroborated in a recent study by Maner, Gailliot, Rouby, and Miller (2007). Employing a visual cueing method, Maner et al. (2007) found that a "jealousy prime increased attention to attractive same sex targets [i.e., a potential rival] among participants who tended to worry about potential rivals. No such effect was observed among those exhibiting less concern about possible rivals" (p. 398). As in the present study, this effect was not only affected by "functionally-relevant individual differences" (Maner et al., 2007), but was also driven by specific input inasmuch that increased attention was not observed for average looking possible rivals.

Additionally, there appears to be a noticeable similarity between the functioning of the jealousy and the fear mechanism which both evolved to deal with threatening events. Both mechanisms reveal pronounced difficulties in the disengagement of attentive resources from task-irrelevant, threatening cues especially for those individuals for whom the cues are functionally highly relevant. With respect to the fear mechanism, task-irrelevant threatening cues have been found to be relevant for high anxious but not for low anxious individuals (e.g., Fox, Russo, Bowles & Dutton, 2001; Fox, Russo & Dutton, 2002). No differences between high and low anxious individuals in the disengagement of attentive recourses were found for positive and neutral cues.

Limitations to the present study suggest directions for future research. Firstly, being currently involved in a committed romantic relationship was considered as rendering infidelity cues to be more personally relevant than being currently not involved in such a relationship (Buss et al., 1992; Sagarin et al., 2003). However, it would be desirable to experimentally prime feelings of jealousy preferably elicited by imagining either a partner's emotional or sexual infidelity. This would allow for a fine-grained analysis of the effects of jealousy elicited by the two infidelity types on men's and women's attention for infidelity

cues. Secondly, written cues to infidelity employed in the present study presumably require more elaborate evaluation processes than for example pictures of potential rivals (Maner et al., 2007) or visually presented sequences of unfaithful behavior. Thus, the written infidelity cues could be replaced with sequences showing unfaithful behavior like kissing and hugging or sexual activities. Additionally, Schützwohl (2007) reported a series of studies showing that women focus their jealousy feelings preferentially on the (potential) rival(s), whereas men's jealousy feelings are preferentially directed towards the partner. Obviously, it would be interesting to explore whether this sex-difference in the focus of jealousy is also reflected in attentional processes. Finally, the task-irrelevant infidelity cues are presented with a head start. As a consequence, the infidelity cues involuntarily capture attention. This is of course a basic prerequisite for research concerned with difficulties in the disengagement of attentive resources. However it would be also informative to test whether cues to the adaptively primary infidelity type are capable of capturing attention even without such a head start, provided of course that they are also personally relevant.

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Appendix

Cues to emotional infidelity (female version).

Your partner doesn't say "I love you" to you anymore.

Your partner doesn't respond anymore when you tell him that you love him.

Your partner stops returning your phone calls.

Your partner avoids talking about a certain other woman.

Your partner won't look you in the eyes anymore.

Your partner acts nervous when you ask if he is falling in love with another woman.

Cues to sexual infidelity (female version).

Your partner suddenly has difficulty becoming sexually aroused when he and you want to have sex.

Your partner becomes more mechanical in the way he has sex with you.

When your partner and you have sex, he wants to have sex for a shorter duration than usual.

Your partner more often tells you that you are doing something wrong when you have sex together.

You notice that your partner seems bored when you have sex.

Your partner smells like he had sex – although not with you.

Author note

Table 1. Mean recall of targets and distractors as a function of distractor content, participants' sex and relationship status.

	Distractor Content		
	neutral	emotional	sexual
	noutui		SOMM
Men with partner			
targets	1.54	1.92	1.00
distractors	0.19	0.54	0.69
targets – distractors	1.35	1.38	0.31
Men without partner			
targets	1.46	1.38	2.00
distractors	0.08	0.00	0.31
targets – distractors	1.38	1.38	1.69
Women with partner			
targets	1.89	1.37	1.63
distractors	0.37	1.19	0.81
targets – distractors	1.52	0.18	0.82
Women without partner			
targets	1.50	2.00	1.50
distractors	0.00	0.29	0.71
targets – distractors	1.50	1.71	0.79

Figure Captions

- Figure 1. The sequence of events in a given trial.
- Figure 2. Mean recall for neutral, emotional and sexual infidelity distractors and targets of men with partner (upper panel) and without partner (lower panel) as a function of distractor content.
- Figure 3. Mean recall for neutral, emotional and sexual infidelity distractors and targets of women with partner (upper panel) and without partner (lower panel) as a function of distractor content.

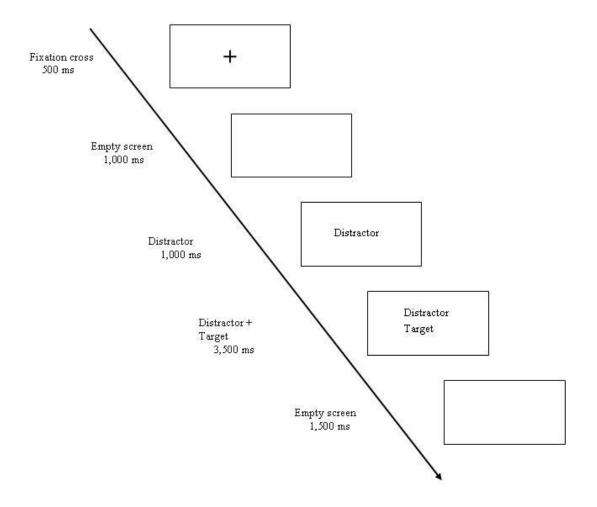


Figure 2 (upper panel)

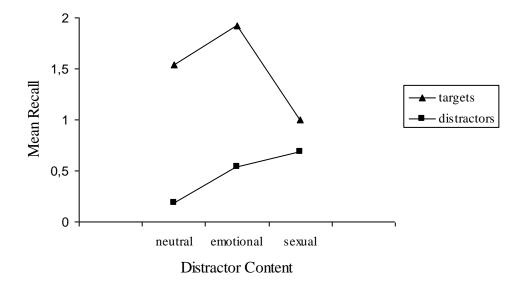


Figure 2 (lower panel)

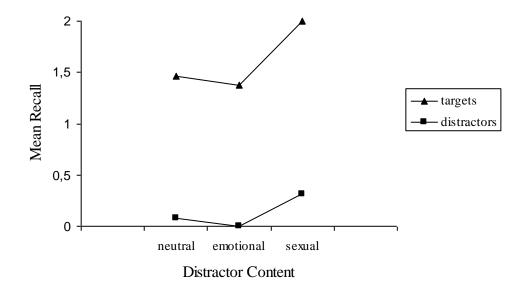


Figure 3 (upper panel)

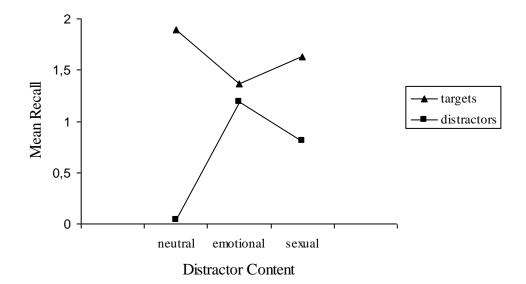


Figure 3 (lower panel)

