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# Attentional biases in individuals with co-occurring hazardous alcohol use and social anxiety

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## Introduction

Social anxiety disorder and alcohol use disorders are highly comorbid, with almost half of all individuals diagnosed with social anxiety disorder also having a lifetime alcohol use disorder (Grant et al., 2005). A better understanding of the mechanisms underlying the development of alcohol use disorders among individuals with social anxiety is an important step in constructing a comprehensive theory of the comorbid condition, which can also aid in the creation of empirically supported clinical treatments for individuals experiencing co-occurring social anxiety and hazardous drinking behaviors.

Cognitive risk factors, such as attentional biases, are one mechanism which may shed light on the social anxiety disorder and alcohol use disorder comorbidity. Attentional biases, or preferential attention toward a cue of motivational relevance, have been robustly demonstrated in socially anxious (Bar-Haim et al., 2007) and alcohol dependent populations (Field & Cox, 2008), and are implicated in theories regarding the development and maintenance of each disorder individually (Clark & Wells, 1995; Field & Cox, 2008; Rapee & Heimberg, 1997). However, little work has been done looking at attentional biases in individuals with co-occurring social anxiety and hazardous alcohol use (Carrigan, Drobos, & Randall, 2004; Gerlach, Schiller, Wild, & Rist, 2006).

The present study is an initial examination of the pattern of attention toward alcohol-related and social threat cues among individuals with co-occurring social anxiety and hazardous drinking behaviors. Volunteers with either co-occurring hazardous drinking and social anxiety (Alc/SA), hazardous drinking only (Alc), social anxiety only (SA), and a control group with neither social anxiety nor hazardous drinking (Control) completed a dot probe task, a computer based cognitive task examining attention to either social threat or alcohol-related cues when paired with neutral lexical cues. It was hypothesized that the Alc/SA group would demonstrate attentional biases (indicated by facilitated attention to and/or difficulty in disengagement from) for both social threat and alcohol-related cues, while the other groups would demonstrate attentional biases to the cue specifically relevant to their grouping (e.g., alcohol-related in the Alc group; social threat in the SA group).

## Method

### Participants

Participants ( $N = 48$ ; 64.4% Female;  $M_{age} = 19.7$ ,  $SD = 1.9$ , range 18-28) were recruited from the undergraduate psychology subject pool at the University of Arkansas based on their responses to previously administered questionnaires (see *Measures*). Participants identified their ethnic background as White/Caucasian 91.5%; African-American/Black 4.3%; Hispanic/Latino 2.1%; Asian/Pacific Islander 2.1%. The majority of participants (77%) were under the legal drinking age.

### Measures and Group Classification

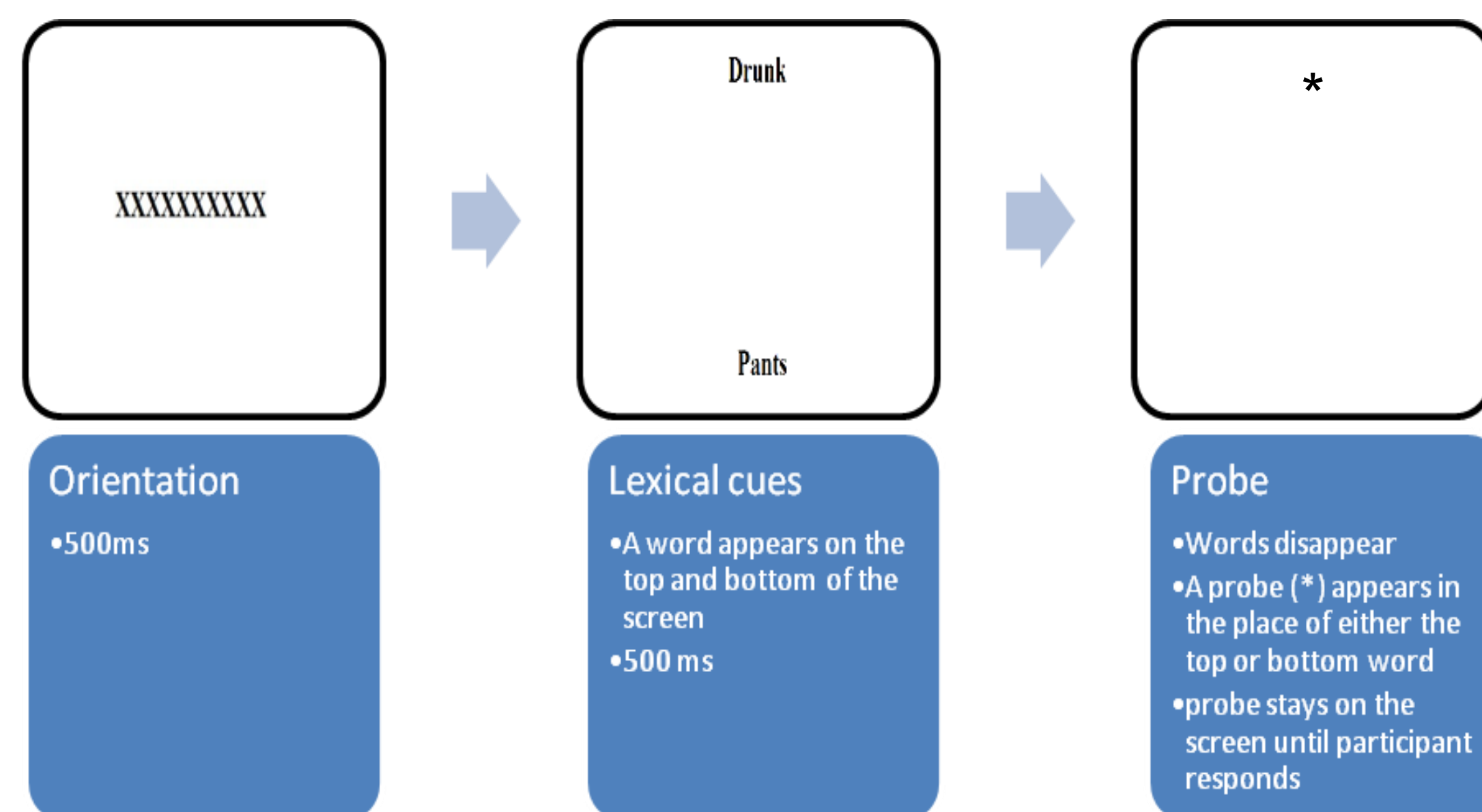
Participants meeting criteria for one of four groups were invited to the study based on their responses to web-based questionnaires completed prior to the laboratory-based dot probe session. Using cutoff scores described below, participants were classified into four groups: (1) Co-occurring at-risk drinking and social anxiety ( $n = 11$ ); (2) Social anxiety only ( $n = 7$ ); (3) At-risk drinking only ( $n = 20$ ), and (4) Controls (do not meet cutoff scores for either the drinking or social anxiety questionnaires;  $n = 10$ ).

**Social Anxiety.** The Social Interaction Anxiety Scale (SIAS) and Social Phobia Scale (SPS; Mattick & Clarke, 1998) are self-report measures indicating social anxiety related to interactions with others and anxiety related to observations by others. Participants scoring  $\geq 34$  on the SIAS and  $\geq 24$  on the SPS are considered to endorse clinical levels of social anxiety (Heimberg Mueller, Holt, Hope, & Liebowitz, 1992).

**Hazardous Alcohol Use.** The Alcohol Use Disorders Identification Test (AUDIT; Babor et al., 2001) is a self-report questionnaire composed of 10 items used to assessing amount and frequency of alcohol use, consequences of use, and symptoms of alcohol dependence. Women scoring  $\geq 5$ , and men scoring  $\geq 6$  are considered at-risk drinkers (Reinert & Allen, 2007). Participants endorsing current abstinence from alcohol due to a previous history of alcohol problems were excluded (Stormark et al., 1997).

### Procedures

**Dot Probe Task.** The dot probe (MacLeod, Mathews, & Tata, 1986) is a computer based task assessing attention to two competing cues via differences in reaction times. In the dot probe task, two cues are presented simultaneously on a computer screen: one on the top of the screen and one on the bottom. After 500ms, the cues are removed from the screen and a "probe" (\*) appears in the location of one of the two cues. The participant is to indicate, by key press, the location of the probe (top or bottom) as quickly as possible (see Figure 1). Attentional bias is inferred by response time latencies: faster response times to the location of a probe indicate that attention was focused on the cue present in that location immediately prior to the appearance of the probe. Slower response times to the location of a probe indicate that attention was focused away from the cue that the probe had replaced. Cues of experimental interest (e.g., social threat; alcohol-related) are paired with a neutral cue, to assess focus toward or away from the experimental word.



**Stimulus cues.** Four different word categories consisting of 10 words each were used: two experimental categories (alcohol-related; social threat) and two neutral categories (animals; clothing). Words were matched across categories on length and frequency of usage in the English language (Balota et al., 2007). A total of 120 trials related to the present study, in a 3 (word pairings: neutral/neutral; social threat/neutral; alcohol-related/neutral) x 2 (word location: top vs. bottom) x 2 (probe location: top vs. bottom) x 10 (words in each category) design. The entire study lasted approximately 30 minutes, after which participants were debriefed.

Figure 1. Dot probe task. The top boxes indicate the image on the computer screen at each part of the task.

## Results

Recent analytical suggestions (e.g., Cisler, Bacon, & Williams, in press; Koster et al., 2004) support comparing the incongruent and congruent trials with reaction times (RT) to conditions with a neutral/neutral pairing, in order to determine how attention differs to experimental cues when compared to a "typical" attentional state.

- Neutral/neutral baseline trials RT – congruent trials RT
  - Positive indices = facilitated attention (or quick attentional capture)
  - Negative indices = slower attentional engagement with cue
- Incongruent trials RT – neutral/neutral baseline trials RT
  - Positive indices = difficulty in disengagement (or difficulty switching to the task focus [probe identification] in the presence of an experimental cue)
  - Negative indices = faster attending away from cue

A repeated measures mixed model ANOVA in a 4 (group: Alc/SA, SA, Alc, Control) x 2 (orientation: facilitated attention; difficulty in disengagement) x 2 (cue: alcohol-related; social threat) yielded only a significant main effect for group,  $F(3, 38) = 3.88$ ,  $p = .02$ . Follow-up analyses indicate that this effect was driven by a significant difference in overall mean RT between control group ( $M = 9.22$ ,  $SD = 3.18$ ) and the alcohol only group ( $M = -3.21$ ,  $SD = 2.18$ ;  $p = .02$ ) and a marginally significant difference between the control group and the social anxiety only group ( $M = -3.48$ ,  $SD = 3.40$ ;  $p = .06$ ). Table 1 illustrates the group x orientation x cue RT means, as well as indicates RT that significantly differed from the neutral/neutral baseline using one-sample t-tests. These tests indicate slower attentional engagement with social threat cues among the social anxiety only group, and facilitated attention toward social threat cues for the control group. The Alc/SA group evidenced significant attentional avoidance of, or attending away from, alcohol-related related cues.

Table 1  
Time (ms) difference in comparison to neutral/neutral baseline (SD)

|                             | Alc/SA<br>(n=11)            | SA<br>(n=7)                | Alc<br>(n=20)              | Control<br>(n=10)           | F                             |
|-----------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|-------------------------------|
| <b>Social Threat</b>        |                             |                            |                            |                             |                               |
| Facilitated Attention       | 3.24 (17.46)                | -3.45 (14.46)              | -3.73 (23.70) <sup>a</sup> | 20.03 (24.37) <sup>a*</sup> | $F(3, 43) = 4.17$ , $p = .01$ |
| Difficulty in disengagement | 1.29 (17.25)                | -9.50 (8.19) <sup>a*</sup> | -2.81 (16.83)              | 1.45 (15.98)                | $F(3, 42) < 1$ , $ns$         |
| <b>Alcohol-Related</b>      |                             |                            |                            |                             |                               |
| Facilitated Attention       | 4.35 (26.23)                | -1.46 (31.98)              | -4.34 (30.81)              | 8.01 (28.29)                | $F(3, 43) < 1$ , $ns$         |
| Difficulty in disengagement | -8.85 (12.05) <sup>a*</sup> | 0.50 (21.21)               | -1.97 (14.56)              | 7.41 (17.47)                | $F(3, 39) = 1.48$ , $ns$      |

Note. Positive indices indicate facilitated attention or difficulty in disengagement. Negative indices slower attentional engagement or faster attention away from cue. <sup>a</sup> = significant ( $p < .05$ ) between-group differences.

\* = indicates significant ( $p < .05$ ) differences from a neutral/neutral baseline.

## Discussion

The present study was an initial attempt to examine patterns of attentional biases in individuals with co-occurring hazardous drinking behaviors and social anxiety. Undergraduates reporting either co-occurring at-risk drinking and social anxiety, social anxiety alone, hazardous drinking alone, or a control group completed a dot-probe task, indicating preferential attention to either alcohol-related or social threat cues when compared to a baseline neutral stimulus. Examination of cognitive risk factors, such as attentional biases, can help elucidate cognitive mechanisms underlying at-risk drinking behaviors among socially anxious individuals.

Contrary to hypotheses, the control group was the only group to evidence attentional biases to social threat related cues (indicated by significant facilitated attention). The social anxiety only group actually evidenced slower attentional engagement of socially threatening cues. This finding however, is in line with some attention bias literature illustrating attentional *avoidance* among socially anxious individuals (e.g., Chen, Ehlers, Clark, & Mansell, 2002). The Alc/SA group, while evidencing positive indices indicative of both facilitated attention toward and difficulty in disengagement from social threat cues, did not reach clinical significance. Significant between-group differences were primarily a result of the control group evidencing a different pattern of attention from the Alc/SA, SA, and Alc groups.

In examining attention toward alcohol-related cues, we again did not confirm hypotheses regarding attentional biases in the Alc condition. However, the Alc/SA group did evidence significant attention away from alcohol-related cues, indicating preferential attention toward neutral rather than alcohol-related cues. Literature examining the cognitive relationship between social anxiety and hazardous drinking has focused largely on drinking to cope with anxiety as a mechanism for initiating and maintaining alcohol use (e.g., Carrigan, Drobos, & Randall, 2004; Field & Powell, 2007). Field and Powell (2007) specifically found that attentional biases to alcohol cues were only evident among individuals exposed to a stressor (i.e., an impending speech) AND who endorsed high levels of drinking to cope motives. As the present study lacked a specific stress induction, it is possible that individuals in the co-occurring social anxiety and hazardous drinking group might be those who are more likely to endorse drinking to cope motives, and thus more responsive to alcohol-related cues following a stressor.

Though this study marks an important initial foray into examining cognitive risk factors present in co-occurring social anxiety and alcohol use disorders, several limitations are present that need to be addressed in future studies. The low sample size in each group, combined with the high variability in scores makes increased sample size a necessary first step in drawing valid and reliable conclusions regarding the present study. Additionally, the lexical cues used in this study may be limited in the emotional response (and subsequent attentional focus) elicited. Picture cues (e.g., alcoholic beverages, angry faces) may be a more ecologically valid way to gauge attentional orientation to these cues. Future studies may examine the attentional time course of orientation to these cues, and introduce social stressors and/or alcohol administration to get a better picture of the cognitive processing underlying co-occurring social anxiety and alcohol use disorders.