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This document provides a concise overview of the dual-probe approach for assessing attentional bias, highlighting its advantages over conventional methods. It then introduces the Dual-Probe Talking Heads General Threat task, developed based on this approach. Finally, it presents the main findings of a study that investigated the internal reliability and sensitivity of this novel task in capturing individual differences in trait anxiety-linked attentional bias to general negative information.

The Dual Probe Approach

When compared to conventional approaches for assessing attentional bias, the dual probe approach has two distinct advantages:

1) It exhibits much higher psychometric reliability than other approaches.

2) It readily permits delivery of ecologically valid video stimuli.

In the following, evidence demonstrating the high psychometric reliability of the dual probe task will be briefly discussed. The ways in which the dual probe approach can be exploited through delivery of video stimuli will then be highlighted.

The Dual Probe Approach has High Psychometric Reliability

The most common approach for assessing anxiety-linked selective attention is the attentional probe task (MacLeod, Mathews, & Tata, 1986). In this task, participants are briefly presented with stimulus pairs that usually comprise one negative and one benign member. A single visual probe subsequently appears in the locus where either member of the stimulus pair was just displayed. Participants must quickly identify this probe, which remains on-screen until the identification response is detected. Using this approach, an index of selective attention to the negative information can be obtained by computing the degree to which this response is speeded for probes appearing in the locus of the negative compared to benign member of the stimulus pair provides.

Recently, several investigators have demonstrated that this conventional version of the attentional probe task has low psychometric reliability, with estimates of internal consistency coefficient and test-retest reliability often < 0.30 (e.g. Schmuckle, 2009). The dual probe variant of the attentional

probe task was developed in response to such findings. The key innovation of this new approach is the simultaneous presentation of two probes, very briefly (200 ms), one in each screen location. Participants simply identity whatever probes that appears in the location that they are attending to, and probe identification accuracy is measured. Using this approach, an index of selective attention can be obtained by computing the proportion of correctly identified probes that had appeared in each of the two locations. The development of the dual probe task is described in Grafton et al. (2021). As demonstrated in this paper, the dual probe task exhibits high psychometric reliability. Across four studies, the average internal consistency coefficient of the task was 0.90, and the average test-retest reliability was 0.81. Thus, the dual probe approach clearly demonstrates superior psychometric reliability compared to conventional attentional assessment approaches.

Exploiting the Dual Probe Task through Delivery of Video Stimuli

The dual probe approach does not lend itself to delivery with pairs of single words or images, as have typically been used in conventional attentional assessment tasks (for more information please refer to Study 3 in Grafton et al., 2021). However, it does readily permit delivery of video stimuli. There are three key advantages of video stimuli over single words or images.

1) Video stimuli are more ecologically valid than single words or images

2) Video stimuli are more informationally rich than single words or images

3) Video stimuli can be configured in ways that single words or images cannot, to enable test of more precise hypotheses concerning the attentional basis of elevated anxiety vulnerability or other dimensions of individual difference.

As shown in Grafton et al. (2021), and in other studies (e.g. Grafton et al., 2023), the use of negative vs. benign video stimuli enables detection of anxiety-linked differences in attentional bias to negative information, while retaining high psychometric reliability.

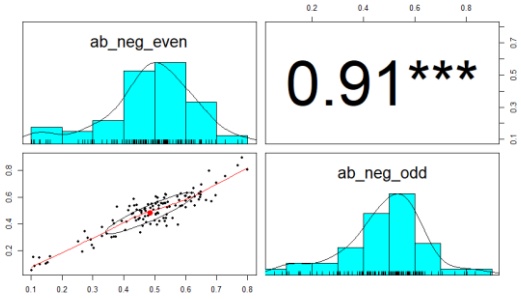
It should be noted that use of dual probe approach with video stimuli is not restricted to investigation of the attentional basis of elevated anxiety vulnerability. Indeed, it can also be employed to advance understanding of the anomalous patterns of attentional selectivity implicated in other types of individual difference and psychological dysfunction. For example, Weichert et al. (2021) and Cahill et al. (2021) have used the approach to illuminate the attentional basis of maladaptive alcohol consumption.

Video stimuli can be configured in many ways. For example, video stimuli could be Hollywood movies (Grafton et al., 2021), they could be content taken from other media that people are regularly exposed to everyday life (e.g. TV or social media, Weichert et al., 2021), or they could be custom recordings of people reporting negative vs positive expectancies, beliefs or experiences, of

direct relevance to the concerns of the individual difference dimension of interest (e.g. Grafton et al., 2023).

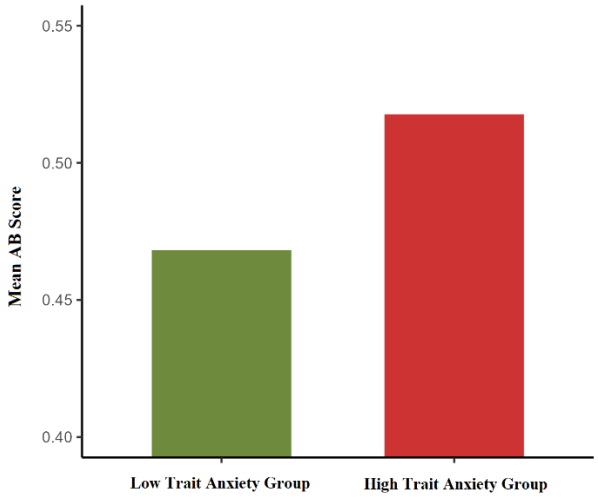
We recognise that creation of video stimuli may be a barrier for some researchers. Thus, we have developed this set of stimuli of comprising video clips of people describing negative vs. benign experiences, across a broad range of topics about health, appearance, social interactions, performance, safety and security, and ability to control situations that are likely to be of concern to people in their everyday lives. This task which was named the Dual-Probe Talking Heads General Threat task was employed in a very recent study to address two primary questions: 1) Can this novel task yield a reliable measure of attentional bias towards general negative information? 2) Does it detect anxiety-linked individual differences in attentional bias to general negative information?

A total of 167 students at the University of Western Australia completed the Dual-Probe Talking Heads General Threat task and the Trait Anxiety Inventory to assess their trait anxiety levels. Internal reliability of the task was assessed using the split-half (odd vs. even) method and demonstrated excellent internal reliability (see the below image).

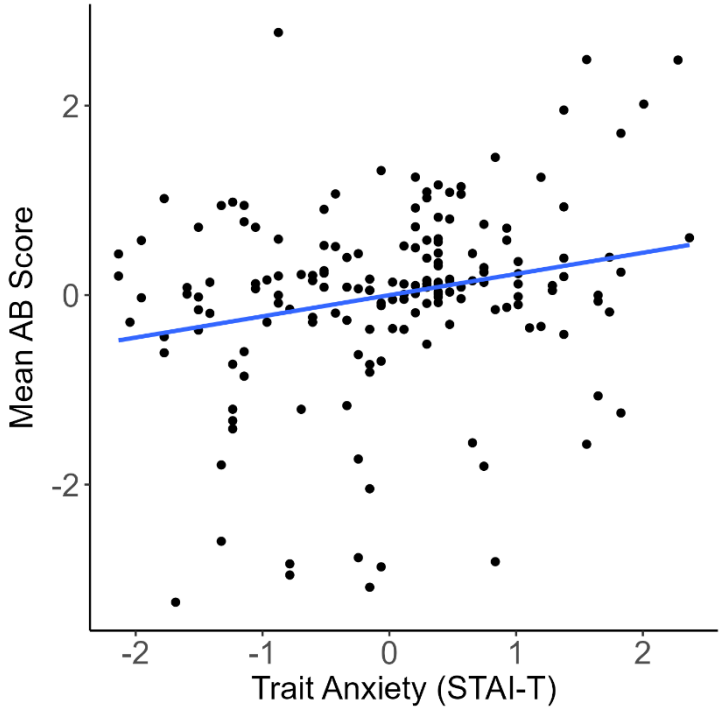


To examine the sensitivity of the task to individual differences in anxiety-related attentional bias towards negative information, two methods were employed:

1- Group Comparison: In line with established practices in the field, a group comparison was conducted between participants with high (top third, n = 55) and low (bottom third, n = 56) scores on trait anxiety. The attentional bias index was used as the measure for comparison. As illustrated in the image below, a significant group difference was observed, with the high-anxiety group exhibiting significantly greater attentional bias towards negative information compared to the low-anxiety group ($F(1, 109) = 4.09$, $p = 0.04$).



2- Correlation: We further performed an analysis that included all participants (n = 167), examining the correlation between the attentional bias index and trait anxiety scores. This analysis revealed a significant positive correlation between attentional bias towards negative information and trait anxiety scores, as depicted in the image below (r (165) = 0.22, p = 0.003).



These promising results demonstrate that the novel task based on the dual-probe paradigm is both internally reliable and sensitive to individual differences in anxiety-linked attentional bias to negative information. We hope that by providing these stimuli, a greater number of researchers will be able to take advantage of the dual probe approach in their own research.

Key References

Grafton, B., Teng, S., & MacLeod, C. (2021). Two probes and better than one: Development of a psychometrically reliable variant of the attentional probe task. *Behaviour Research and Therapy.* 138.

Grafton, B., Long, C., & MacLeod, C. (2023). The contribution of attentional bias to negative information to social anxiety-linked heightened state anxiety during a social event. *Cognitive Therapy and Research*.

Cahill, C., White, M., MacLeod, C., & Grafton, B. (2021). Craving mediates the association between attentional bias to alcohol and in-vivo alcoholic beverage consumption in young social drinkers. *Psychology of Addictive Behaviours*. *35*(8), 895–900.

Wiechert, S., Grafton, B., MacLeod, C., & Weirs, R. (2021). When alcohol adverts catch the eye: A psychometrically reliable dual-probe measure of attentional bias*. Environmental Research and Public Health 18*(24), 13263.