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The Impact of Anxiety on Reading Behavior: An Exploratory Eye-Tracking Study

Research-in-Progress

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ABSTRACT

Anxiety is one of the most frequently diagnosed mental health symptoms among young adults (Lee et al., 2021). Studies suggest that anxious individuals, more than healthy individuals, exhibit attentional bias toward stimuli that they find threatening. To examine the impact on attention, studies typically use a presentation stimuli-task paradigm that captures reactions to relatively simple visual stimuli (e.g., pairs of anxiety-related and neutral words) during short, fixed intervals (Clauss et al., 2022). A recent NueroIS study shows that using a more context-rich stimuli-task paradigm (i.e., completing anxiety-related surveys) that does not impose a time limit can provide more opportunities for capturing subtle nuances of attentional bias (Alrefaei et al., 2023). Extending the findings of this previous NeuroIS research, our exploratory study aims to evaluate the effectiveness of a new stimuli-task paradigm and its related eye-movement measures in detecting nuances of attentional bias in the context of anxiety. A short paragraph from an online text passage about bee intelligence was selected. Via a pre-study, it was confirmed that reading this short paragraph indirectly cues anxious feelings. The passage contained six sentences, with each defined as a separate Area of Interest (AOI). For each AOI attentional bias was calculated as: 1) saccade-to-fixation count (SC/FC) representing shift in focus, and 2) fixation-to-visit duration (FD/VD) representing direct attention to content. Tobii Pro Spectrum 600HZ was used to collect gaze data from 24 undergraduate students in university. The raw gaze data was translated into fixations via the IVT filter with a saccade identification threshold of 30°/s and a fixation duration threshold of 100ms. Gaze data was categorized into anxiety (n=12) and anxiety-free (n=12) groups based on participants' self-reported anxiety measure in the PROMIS+29 v2 profile which is used in clinical settings. Results show that participants in the anxiety group, compared to those in the anxiety-free group, exhibited significantly different attentional patterns when reading 4 out of the 6 sentences (67% of AOIs). The differences in shift of attention between the two groups were more prominent (67% of AOIs) than direct attention to content (17% of AOIs). These results, which are consistent with the cognitive model of selective attention (Matthews & MacLeod, 1994), provide support for the effectiveness of the new stimuli-task paradigm and its eye-movement features in detecting differences in attentional processes between people with and without anxiety. The detected differences in visual attention between the two groups suggest that eye movements may serve as a biomarker of anxiety. Future research should explore these differences in larger and more diverse populations to validate and extend these findings.

Keywords

Anxiety, NeuroIS, Attentional bias, Eye tracking.

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