The effects of stress and anxiety on a cued attention task
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Background and Significance

- Previous research has shown that visual attention tasks like the Infant Orienting With Attention (IOWA) Task are effective in identifying individual differences in attention in both adults and infants (Ross-Sheehy et al., 2015).
- Additionally, high levels of anxiety and/or stress have been found to affect visual behavior and cognitive performance (Grillon et al., 2006).
- If performance on a visual attention task is influenced by individual differences in physiological arousal and cognitive functioning, then we might expect performance to vary as a function of stress and/or anxiety.

Methods

Visual Attention Task:
- Participants (55 adults; 35 females, 20 males) were tested in a modified version of the IOWA Task consisting of valid, invalid, and no cue conditions both with and without tones.
- The task was presented on an EyeLink 1000 plus eye-tracker.
- The subjects reported the location of a target image using a button-press.
- Task measures collected were pupillometry, reaction time (RT), and accuracy.

Stress/Axiety Assessment:
- Participants completed the Perceived Stress Scale (Cohen, Kamarck & Mermelstein, 1983) and Beck Anxiety Inventory (Beck, Epstein, Brown & Steer, 1988).
- Perceived Stress Scale (PSS) Sample Questions:
  - “In the last month, how often have you been upset because of something that happened unexpectedly?”
  - “In the last month, how often have you felt that you were unable to control the important things in your life?”
- Beck Anxiety Inventory (BAI) Sample Questions:
  - Indicate how often in the past month you have been bothered by each of the following symptoms: heart pounding/racing, unable to relax, dizzy or lightheaded, shaky/unsure, etc.
- Scores from the BAI and PSS were used to separate the subjects into three distinct groups:
  1. Low Stress (n=17)
  2. High Stress Low Anxiety (n=24)
  3. High Stress High Anxiety (n=14)

Results

- Error Rate by Stress Group
  - The High Stress Low Anxiety group made significantly more errors than both High Stress High Anxiety and Low Stress groups, F(2,102)=5.13, p<.001 and this is especially apparent in the Invalid Condition, F(4,102)=3.29, p=.014.

Discussion

- Overall, results replicate previous work and demonstrate robust effects of both spatial and auditory cues on reaction time, error rate, and pupil change. Participants were slower and made the most errors in conditions that required effortful control of attention (invalid cues), and this increased mental effort was also apparent in pupillometry.
- However, results also reveal that high levels of stress negatively impacted attentional performance, particularly for error rates.
- Importantly, however, the negative effects of stress may be overcome in individuals with relatively high anxiety. We interpret this finding as evidence of hypervigilance, including a heightened state of arousal, and increased allocation of attentional resources to the task.
- Future work will attempt to further isolate the effects of hypervigilance by manipulating stress and anxiety, task difficulty, and the alerting properties of the tone.