On the Automaticity of Attentional Orienting to Threatening Stimuli

Research on attention and automaticity has shown individuals are biased to direct their attention toward stimuli that are associated with negative, or aversive, outcomes. Explanations of this bias conclude that people automatically orient toward threat to brace themselves or avoid the threatening event. This bias has been critically important for survival and adaptation. However, past research has not shown the degree of automaticity involved in this bias. That is, how automatic are these responses?

Dr. Brian Anderson, a cognitive neuroscientist in the Department of Psychological and Brain Sciences at Texas A&M University, and his colleague, Mark Britton, sought to explain the degree of automaticity involved in attentional bias to aversive events. They used similar methods to that of Nissens et. al. (2017) in which participants were exposed to a target and two color distractors. One color signaled a potential shock at the end of the trial, termed CS+, but the shock was only delivered if participants were slow to fixate on the target. Refocusing oneself on the target takes time after fixating on the distractor, so the distractor colors actually increased the chance of receiving a shock. Despite the shock punishment, participants were more likely to fixate on the CS+ distractor compared to the neutral distractor (CS-). Dr. Anderson and his team note that the design of Nissens et. al. (2017) allowed participants to learn to avoid the shock, that is, CS+ told participants when to exert the most effort into the task. In other words, participants were encouraged to explicitly monitor for threat instead of relying on their automatic responses. Anderson and Britton directly tested for automaticity by immediately punishing fixation on CS+, providing a strong incentive to curb orientation to the stimulus. They hypothesized that attentional bias toward CS+ under these conditions would provide gripping evidence for automaticity.

The researchers recruited twenty-eight participants from Texas A&M University who received course credit for completing the research. Participants completed their tasks on a computer monitor with electrodes attached to their left forearm. The shocks that were administered were calibrated to be “unpleasant, but not painful.” Each trial consisted of a target that was either a diamond inside an array or circles or a single circle in an array of diamonds. When distractors were present, one of the non-targets were rendered red or blue while the rest were gray; distractor-absent trials consisted of all gray shapes. Participants were told to look directly at the unique shape on the monitor and informed that they would sometimes receive a shock depending on where they looked. They were not told which color (red or blue) predicted the shock to avoid orientation bias.

Fixation on a shape stimuli was recorded if eye position

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Cheyenne and Shicoyia are currently undergraduate psychology majors. They will be giving updates on the cutting-edge research conducted at TAMU’s Department of Psychological and Brain Sciences throughout the semester.

remained within a region extending 0.7° around the stimulus for a continuous period of 50 ms. Response time was measured from the onset of the display until fixation was registered. Both the CS+ and CS- distractors were significantly more likely to be the first stimulus fixed on compared with a non-target on distractor-absent trials. Participants were also significantly more likely to initially fixate a CS+ distractor compared with a CS- ($p = 0.18$). These results indicate that signals for threat are attended to automatically, regardless of if the fixation is counterproductive. Anderson and Britton's hypothesis was supported by direct evidence of automaticity of attentional bias to threat. Interestingly, the results also show that participants failed to adaptively adjust their behavior to avoid punishment, suggesting that the attention system may be more powerful than punishment learning when controlling behavior. This research points to new directions in the relationship between reward, punishment, and behavior. Specifically, future research should focus on the underlying neural mechanisms that control the types of behavior present in studies such as these.

For more information on this interesting research, read the full article here:
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