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Arm Flexion, Arm Extension, and Motivational Responses to Feared Stimuli

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Abstract

People are highly motivated to approach attractive stimuli and to avoid noxious stimuli (e.g., Lang, Bradley, & Cuthbert, 1990; Schneirla, 1959. Approach of attractive stimuli (e.g., obtaining food, pursuit of sexual relations) and avoidance of noxious stimuli (e.g., defense against predatory threat) ensure continued survival, a basic goal of all living organisms. And yet, sometimes approach/avoidance behavior is maladaptive. For instance, individuals with intense fears of spiders experience strong avoidance motivation in spite of the relative harmlessness of most spiders.

The research reported here evaluated whether a simple, easily executed bodily manipulation can dampen the strong avoidance motivation that typically results when a person is exposed to cues of a feared stimulus (e.g., Hamm, Cuthbert, Globisch, & Vaitl, 1997). Previous research in our laboratory (Thibodeau, 2011) and others (e.g., Cacioppo, Priester, & Berntson, 1993) suggests that the execution of simple actions normally associated with approach behavior (e.g., arm flexion, as when pulling attractive objects near) is sufficient, by itself, to elicit approach motivation. The current research explored whether spider- and snake-fearful undergraduates and non-fearful controls who were exposed to photographs of fear-relevant stimuli could diminish the size and strength of avoidance motives simply by concurrently engaging in an approach-related action. The startle probe (Lang et al., 1990) was used to index the strength of participants' avoidance motives.

METHOD

Forty undergraduates participated in the study for course credit. Fearful participants (n = 24) obtained scores above 20 on self-report questionnaires measuring snake or spider fear (*Klorman,* Weerts, Hastings, Melamed, & Lang, 1974); controls (n = 16) obtained scores below 6.

The startle reflex was indexed by electromyographic (EMG) recording of the orbicularis oculi ("blink") muscle, contraction of which causes the sudden closure of the eyelids that represents a key element of the startle response. Participants viewed a series of 45 pictures (15 spiders or snakes, 15 household objects, 15 fixation crosses) and concurrently performed arm flexion (an approach action), arm extension (an avoidance action), or squeezed the edge of a table (a neutral control action); all pictures and actions were presented in a quasi-randomized sequence. Bursts of 50-ms white noise (98 dB) were unpredictably presented to elicit the startle reflex. We followed standard procedures for the reduction and scoring of startle data (Blumenthal et al., 2005).

RESULTS AND DISCUSSION

Contrary to predictions, the motivational actions were not related to the size of the startle reflex (Action main effect; p = .27). This pattern held for both groups (Action x Group interaction; p = .17), and it was not moderated by Picture Type (Action x Picture Type interaction; p = .90). The three-way interaction was also nonsignificant (p = .15). Importantly, however, a significant main effect of Picture Type ($F[2,76] = 7.03$, p = .002) confirmed a previously documented pattern of heightened startle reactivity during viewing of fear-relevant pictures (e.g., Hamm et al., 1997). Overall, the present data suggest that the motivational actions utilized here (Cacioppo et al., 1993; Thibodeau, 2011) are insufficient to moderate avoidance-related emotional responses to feared stimuli.

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INTRODUCTION

- People are highly motivated to approach attractive stimuli and avoid noxious stimuli (Lang et al., 1990; Schneirla, 1959).
- Both kinds of motives facilitate continued survival, a basic goal of all living organisms.
- However, some approach/avoidance behavior is maladaptive. For instance, individuals with intense fears of spiders experience strong avoidance motivation in spite of the relative harmlessness of most spiders.
- Some individuals with such fears seek ways to reduce their distress and diminish the strong avoidance motives that typically result from confrontation with feared stimuli (e.g., Hamm et al., 1997).
- Can a simple, easily executed bodily manipulation dampen the strong avoidance motivation that typically results when a person is exposed to cues of a feared stimulus?
- Previous research in our laboratory (Thibodeau, 2011) and others (e.g., Cacioppo et al., 1993) suggests that the execution of arm flexion, as when pulling attractive objects near, is sufficient to elicit approach motivation.
- **The current research explored whether spider- and snake-fearful undergraduates and non-fearful controls who were exposed to photographs of fear-relevant stimuli could diminish the strength of avoidance motives by concurrently engaging in approach-related arm flexion.**
- We used the startle probe to index approach motivation.
- The startle probe is premised on the finding that the startle reflex is enhanced during the experience of approach motivation and attenuated during the experience of avoidance motivation (Lang et al., 1990).

METHOD

Participants

- 40 undergraduates participated in the study for course credit. Fearful participants (n = 24) obtained scores above 20 on self-report questionnaires measuring snake or spider fear (Klorman et al., 1974); controls (n = 16) obtained scores below 6

Design and Procedure

- The participants' skin was prepared for the EMG recording and electrodes were attached to the skin overlaying the orbicularis oculi muscle responsible for the startle blink (see Fridlund and Cacioppo, 1986).
- Participants were seated in a chair facing a 17-inch LCD screen (approximately 2.5 feet away).
- Participants viewed 45 pictures (15 spiders or snakes, 15 household objects, 15 fixation crosses) and concurrently performed arm flexion (approach), arm extension (avoidance), or squeezed the edge of a table (neutral control). Pictures and actions were paired in a quasi-randomized sequence.
- E-Prime stimulus presentation software coordinated the timing of the experimental events. For each trial, participants viewed a screen that alerted them to the action to be performed (3 s). A second screen instructed them to prepare for the action by placing their hands in the appropriate position (3 s). Offset of the preparation screen was followed by onset of the picture (9 s). Participants were instructed to perform the action for the entire time the picture appeared. Intertrial intervals that varied between 8 s and 12 s followed each trial.
- During execution of the actions, bursts of 50-ms white noise (98 dB) were unpredictably presented over headphones to elicit the startle reflex. 80% of all trials were probed.

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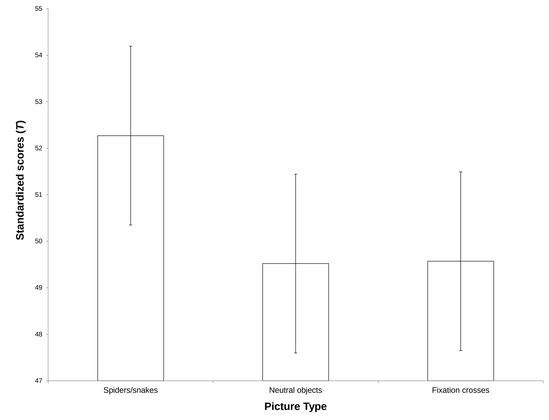
RESULTS

- Data were analyzed using a 3 (Action Type) x 3 (Picture Type) x 2 (Group) ANOVA.
- Contrary to predictions, the motivational actions were not related to the size of the startle reflex (Action Type main effect; p = .27). This pattern held for both groups (Action Type x Group interaction; p = .17), and it was not moderated by Picture Type (Action Type x Picture Type interaction; p = .90). The three-way interaction was also nonsignificant (p = .15).
- A significant main effect of Picture Type, $F(2,76) = 7.03$, p = .002, confirmed a previously documented pattern of heightened startle reactivity during viewing of fear-relevant pictures (e.g., Hamm et al., 1997).The Picture Type main effect is graphically displayed in Figure 1.

Figure 1. Mean startle magnitude (T scores) during viewing of spiders/snakes, neutral objects, and fixation crosses. Error bars represent 95% CIs.



DISCUSSION

- Overall, the present data suggest that the motivational actions utilized here (Cacioppo et al., 1993; Thibodeau, 2011) are insufficient to moderate avoidance-related motivational responses to feared stimuli.
- However, it is possible that emergence of the effect we predicted would require more extensive pairing of arm flexion with fear-relevant cues.
- Other measures of motivational processes could also be utilized to evaluate the effect of arm flexion on responses to feared stimuli.