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## Spider-fearful individuals hesitantly approach threat, whereas depressed individuals do not persistently approach reward



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### ABSTRACT

**Background and objectives:** Much research documents that anxiety is related to the avoidance of threatening information. Research is also beginning to suggest that depression is related to a lack of approach toward positive information. However, many questions remain regarding the specificity and robustness of these effects. The goal of the present study was to examine specific motivational patterns differentiating between anxiety and depression.

**Methods:** The current study used the approach-avoidance task (AAT) to further investigate these phenomena. Spider-fearful, depressed, and non-fearful/non-depressed (control) participants pulled or pushed a joystick lever in response to positive, neutral, and negative (spider and spider-unrelated) pictures. Unlike in previous AAT studies, duration times (DTs) of joystick movements were examined in addition to reaction times (RTs).

**Results:** As hypothesized, in contrast to depressed and control groups, spider-fearful participants exhibited avoidance tendencies by evidencing slower RTs when pulling the joystick in response to spider versus neutral pictures. As further hypothesized, depressed participants exhibited diminished approach motivation as evidenced by their pulling positive pictures for a shorter duration than neutral pictures, in comparison to the control group.

**Limitations:** Participants in our study were from a non-clinical student sample and further research is required for generalization to spider phobia and major depressive disorder.

**Conclusion:** These findings inform theoretical understanding of the specific motivational tendencies of anxiety and depression, and introduce a modification of the AAT that, if incorporated in clinical settings, would increase the specificity and success of cognitive bias modifications.

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### 1. Introduction

Anxiety and depressive disorders are the most common forms of psychopathology (Kessler, Chiu, & Demler, 2005). Depressive disorders are particularly difficult to treat, as evidenced by limited symptom remission to empirically supported treatments (e.g., Dimidjian et al., 2006) and high risk of relapse (e.g., Scott et al., 2000). The high rates of comorbidity of anxiety and depression symptoms (Kessler et al., 2005) may be one factor hindering conceptualization and thus successful treatments. Therefore, unraveling the core, non-overlapping features of each disorder is key.

One way to distinguish core features may be through examining differences in approach-avoidance motivational tendencies (e.g., Davidson, 1993). Extant models suggest that a unique motivational aspect of anxiety may be *heightened avoidance of negative information*,<sup>1</sup> whereas a unique motivational aspect of depression may be *diminished approach of rewarding information* (e.g., Davidson, 1998; Dickson, 2006; Henriques & Davidson, 2000; Kashdan, Elhai, & Breen, 2008). However, empirical research has yet to elucidate how these differential motivational tendencies specifically unfold over time.

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<sup>1</sup> Although research indicates that anxious individuals initially attend to threatening information, studies also support the vigilance-avoidance hypothesis, which suggest that these individuals ultimately avoid threatening information (e.g., Cooper & Langton, 2006; Mogg, Bradley, Miles, & Dixon, 2004).

### 1.1. Assessing motivational tendencies using the approach-avoidance task

Over half a century ago, Solarz (1960) demonstrated that people display faster arm movements toward themselves than away from themselves when viewing positive stimuli, and that the opposite pattern emerges when viewing negative stimuli. More recent findings suggest that arm movement indicates approach and avoidance tendencies; specifically, arm extension (pushing motion) reflects or activates an avoidance tendency and arm flexion (pulling motion) reflects or activates an approach tendency (Cacioppo, Priester, & Berntson, 1993).

The approach-avoidance task (AAT) is a paradigm used to investigate motivational tendencies. In the AAT, participants are instructed to pull or push a joystick lever as quickly as possible in response to pictures. The AAT is an indirect task because participants do not respond to the content of the pictures but rather to content-irrelevant aspects such as a picture orientation or color of a surrounding frame. An avoidance tendency is inferred when participants push the joystick lever faster than they pull it, whereas an approach tendency is inferred when participants pull the joystick faster than they push it.

In AAT studies, anxious/fearful people commonly demonstrate avoidance in response to threatening pictures, whereas they demonstrate no approach-avoidance tendencies for neutral pictures. In comparison, non-anxious/non-fearful individuals usually do not evidence differential responses due to picture type (Heuer, Rinck, & Becker, 2007; Rinck & Becker, 2007; Roelofs et al., 2010; but see Lange, Keijsers, Becker, & Rinck, 2008). Depression has also been investigated with the AAT in one study in which a clear pattern of findings did not emerge (Seidel et al., 2010). However, due to task limitations discussed below, the version of the AAT used in that study may not have yielded relevant information about depressed individuals' approach tendencies.

### 1.2. Initial modification of the approach-avoidance task

The AAT usually only measures difference scores between reaction times (RTs) of pushing versus pulling a particular picture type, such that negative RT scores indicate avoidance motivation and positive RT scores indicate approach motivation (e.g., Rinck & Becker, 2007; Roelofs et al., 2010). Unfortunately, the use of difference scores leads to ambiguity of data interpretation because negative scores may result from faster arm extension (pushing), slower arm flexion (pulling), or both. Moreover, as argued by Najmi, Kuckertz, and Amir (2010), faster arm extension and slower arm flexion may correspond to different aspects of avoidance. Specifically, pushing away (i.e., removing) a dangerous object may be associated with reduction in fear/anxiety and thus with negative reinforcement, whereas pulling a dangerous object may be related to increase in negative emotions and thus punishment.

To overcome this limitation, Najmi et al. (2010) compared RTs in response to threatening versus neutral pictures *separately* for each movement direction (i.e., pushing and pulling). That is, RTs of pulling threatening pictures were compared not to RTs of pushing threatening pictures but rather to RTs of pulling neutral pictures. This important change in scoring allows for examining each movement direction independently of one another.

### 1.3. A further modification of the AAT: assessment of duration times

Despite Najmi et al.'s (2010) improvement, the AAT may have another previously unaddressed limitation. Reaction times seem to capture avoidance tendencies, but they may not be appropriate for assessment of approach tendencies. Faster movement may be indicative of avoidance when immediate threat is present because

the speed of avoidance of dangerous stimuli (e.g., venomous spiders) may have survival value. However, rewarding stimuli may be more likely to result in persistence rather than fast and short-lasting reactions. Indeed, motivational findings suggest that when people find something rewarding, they persist longer (e.g., Deci & Ryan, 1985). Moreover, the motivation to savor reward may be an important buffer against depressed states (Gilbert, 2012; McMakin, Siegle, & Shirk, 2011).

Thus, although avoidance may be measured by RTs of arm movement, approach could be more properly measured by *duration times* (DTs) of arm movement; that is, higher (or lower) levels of approach motivations should correspond to more (or less) *sustained* arm flexion. Importantly, the use of duration and reaction times would therefore allow for independent assessment of approach and avoidance motivation.

### 1.4. The present study

The present study examined approach and avoidance tendencies in spider-fearful, depressed, and control groups via the modified AAT. Consistent with previous studies, we hypothesized that, unlike depressed and control groups, spider-fearful participants would exhibit avoidance of spider pictures by faster pushing and/or slower pulling of such pictures than neutral pictures. As in previous research, this tendency was examined via the zooming AAT, in which (1) pulling or pushing the joystick lever increases or decreases, respectively, the size of a picture displayed on a screen and (2) reaction times are the outcome variable (cf. Heuer et al., 2007; Najmi et al., 2010; Rinck & Becker, 2007). We also hypothesized that, consistent with previous research (e.g., Davidson, 1998; Dickson, 2006; Kashdan et al., 2008) *but novel to research using the AAT*, depressed individuals would display diminished approach motivation as evidenced by shorter duration times (DTs) (i.e., sustained time spent) pulling positive as opposed to neutral pictures, in comparison to spider-fearful and control groups.

## 2. Methods

### 2.1. Participants

At the beginning of the semester, students in an Introductory Psychology class at a Midwestern university initially completed the Beck Depression Inventory II (BDI-II) and two 5-point items of the Interview for Mood and Anxiety Symptoms (IMAS) assessing fear and avoidance of spiders. The reports of depressive symptoms and fear of spiders were later reassessed with the BDI-II and the Fear of Spider Questionnaire (FSQ; all scales described below), and three groups were preselected: (1) a control group (IMAS  $\leq 3$ , FSQ  $< 50$ , and both initial and reassessment BDI-II  $\leq 13$ ), (2) a spider-fearful group (IMAS = 10, FSQ  $\geq 70$ , and initial BDI-II  $< 20$ ), and (3) a depressed group (IMAS  $< 10$ , and both initial and reassessment BDI-II  $\geq 20$ ). Table 1 presents self-report symptom information for each group. Students ( $N = 120$ ; 65% women;  $M_{age} = 19.22$ ,  $SD = 2.72$ ) meeting the pre-selection criteria participated in exchange for partial course credit. The sample consisted of 29

**Table 1**  
Means (and standard deviations) of self-reported depressive and spider phobia symptoms as a function of group.

Measure	Group		
	Control ( $n = 47$ )	Spider-fearful ( $n = 50$ )	Depressed ( $n = 23$ )
BDI-II	4.70 (3.38)	11.22 (10.33)	<u>29.04</u> (6.87)
FSQ	11.30 (13.12)	<u>102.52</u> (15.83)	44.22 (35.59)

Note. Underlined means are above the clinical cutoff scores. BDI-II = Beck Depression Inventory-II; FSQ = Fear of Spiders Questionnaire.

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