Available online at www.sciencedirect.com
ScienceDirect
Behaviour Research and Therapy 45 (2007) 1271–1284
BEHAVIOUR RESEARCH AND THERAPY
www.elsevier.com/locate/brat

Contamination vs. harm-relevant outcome expectancies and covariation bias in spider phobia

Peter J. de Jong[a,*], Madelon L. Peters[b]

[a]*Department of Developmental and Clinical Psychology, University of Groningen, Grote Kruisstraat 1/2, 9712 TS Groningen, The Netherlands*
[b]*Department of Medical, Clinical, and Experimental Psychology, Maastricht University, The Netherlands*

Received 17 January 2006; received in revised form 26 August 2006; accepted 12 September 2006

Abstract

There is increasing evidence that spiders are not feared because of harmful outcome expectancies but because of disgust and contamination-relevant outcome expectancies. This study investigated the relative strength of contamination- and harm-relevant UCS expectancies and covariation bias in spider phobia. High ($n = 25$) and low ($n = 24$) spider fearful individuals saw a series of slides comprising spiders, pitbulls, maggots, and rabbits. Slides were randomly paired with either a harm-relevant outcome (electrical shock), a contamination-related outcome (drinking of a distasting fluid), or nothing. Spider fearful individuals displayed a contamination-relevant UCS expectancy bias associated with spiders, whereas controls displayed a harm-relevant expectancy bias. There was no evidence for a (differential) postexperimental covariation bias; thus the biased expectancies were not robust against refutation. The present findings add to the evidence that contamination ideation is critically involved in spider phobia.

Keywords: Disgust; Expectancy bias; Covariation bias; Phobia

A phobic stimulus can be conceptualised as a danger signal (e.g., Reiss, 1980, 1991), a predictor that something terrifying will occur following encounters with the phobic stimulus (e.g., "the spider will kill me" Arntz, Lavy, van den Berg, & van Rijsoort, 1993). One explanation for the persistence of this type of danger expectancies could be that phobic individuals tend to overestimate the predictive relationship between phobic stimuli (CS) and aversive outcomes (UCS) (UCS expectancy bias; Davey, 1992). In line with this, several studies using various methodological approaches, and focusing on various fears (e.g., spider phobia, snake phobia, panic disorder, flight phobia), consistently showed that high fear individuals reported inflated expectancies of aversive outcomes following the presentation of fear-relevant stimuli (e.g., de Jong & Merckelbach, 2000; Diamond, Matchett, & Davey, 1995; McNally & Heatherton, 1993; Wiedemann, Pauli, & Dengler, 2001), whereas such inflated expectancies have been found to be absent in successfully treated individuals (Van Overveld, de Jong, Huijding, & Peters, 2006).

*Corresponding author.
E-mail address: p.j.de.jong@rug.nl (P.J. de Jong).

0005-7967/$ - see front matter © 2006 Elsevier Ltd. All rights reserved.
doi:10.1016/j.brat.2006.09.007

The tendency in high fear individuals towards expecting phobic stimuli to be followed by aversive outcomes (i.e., UCS expectancy bias) will logically motivate these people to avoid (and/or escape from) encounters with phobic stimuli. Accordingly, it has been found that danger expectancies were predictive of subsequent avoidance behaviour (e.g., Jones & Menzies, 2000; Whittal & Goetsch, 1997). Sustaining the causative role of danger expectancies, it has been shown that experimentally induced threat expectancies contribute to behavioural avoidance (Boston & Sharpe, 2005). In its turn, avoidance of encounters with phobic stimuli will hinder extinction of fear, as such behaviours deprive fearful individuals from corrective experiences. Interestingly, there is also evidence that even when people cannot avoid or escape potentially correcting encounters with phobic stimuli, strong prior expectancies may be relatively immune to corrective information. That is, a series of illusory correlation (IC) experiments provided evidence to suggest that high fear individuals continue to expect aversive outcomes on fear-relevant trials despite the fact that in a typical IC experiment, the objective contingencies between the various categories of stimuli (e.g., slides of spiders, weapons, or flowers) and outcomes (e.g., shock, siren, or nothing) are objectively random (e.g., 1/3) (e.g., de Jong, Merckelbach, & Arntz, 1991; de Jong & Merckelbach, 2000; Pauli, Montoya, & Martz, 2001).

Moreover, it has been found that high fear individuals also post-experimentally tend to overestimate the veridical covariation between feared stimuli and aversive outcomes (Cavanagh & Davey, 2000; Davey & Dixon, 1996; de Jong, Merckelbach, & Arntz, 1995; Tomarken, Mineka, & Cook, 1989; Tomarken, Sutton, & Mineka, 1995). This a posteriori overestimation of the actual CS-UCS contingency has been termed *covariation bias* (Tomarken et al., 1989). Underlining the clinical significance of this type of associative bias, (residual) post-treatment covariation bias was found to be a powerful predictor of the return of fear following successful exposure treatment (de Jong, van den Hout, & Merckelbach, 1995).

Thus far, studies on fear-relevant UCS expectancy bias and covariation bias primarily focused on harm/pain-relevant outcome associations. This approach logically followed from the conceptualisation of small animal phobias (such as spider phobia) in terms of a predator-defense model (e.g., Öhman, Dimberg, & Öst, 1985). However, there is increasing evidence that small animal phobias might be more efficiently conceptualised in terms of a disease-avoidance model (Matchett & Davey, 1991; de Jong & Muris, 2002). Following this model, fears of low-predation fear-relevant animals arise from people's tendency to associate these animals with outcomes indicating contamination or disease rather than with outcomes related to the animals' predatory properties (e.g., injuries that would result from being bitten) (e.g., Davey, 1994). In line with this, Davey and colleagues recently showed that in the context of a hypothetical conditioning experiment nonselected individuals selectively associated low predation animals (e.g., maggot, cockroach) with a contamination-relevant UCS (drinking a nauseating fluid), whereas participants typically expected a harm-relevant UCS (electrical shock) following predatory animals (e.g., lion) (Davey, Cavanagh, & Lamb, 2003).

As a first exploration of the role of harm/pain-relevant versus contamination-relevant UCS representations in small animal phobias, van Overveld and colleagues recently exposed high and low spider fearful individuals to a similar 'thought-experiment' procedure, thereby adding spiders as a separate category of animals in the experimental design (Van Overveld, de Jong, & Peters, 2006). Participants' a priori expectancies showed that spiders were associated with both types of aversive UCSs, but significantly stronger so in the high fear group. Interestingly, the expectancy bias toward contamination-relevant consequences was the single best predictor of spider fear. Hence these findings provide preliminary support for the idea that contamination rather than harm/pain-relevant preoccupations are critically involved in spider fear (cf. de Jong & Muris, 2002) and are thus consistent with a disease-avoidance conceptualisation of spider fear. Note in passing that a disease-avoidance conceptualization of spider distress does not dispute that fear is the dominant response to spiders (e.g., Sawchuk, Lohr, Westendorf, Meunier, & Tolin, 2002), but implies that the focus of fear involves the probability of unwanted contact with a potential "contaminant" rather than the probability of being bitten and getting injured (e.g., Huijding & de Jong, in press).

The present study was designed to further corroborate the preliminary findings concerning the role of contamination-relevant outcome expectancies in fear of spiders. Therefore, the first aim of this study was to test the robustness of these earlier findings and to see whether a similar pattern of outcome expectancies would emerge during actual encounters with spider stimuli. Following this, the present study investigated spider fearful individuals' outcome expectancies when being involved in an actual illusory correlation experiment, rather than in an imaginary experiment as was used by Van Overveld et al. (2006). The second aim of the study