THE ROLE OF EVALUATIVE LEARNING AND
DISGUST SENSITIVITY IN THE ETIOLOGY AND
TREATMENT OF SPIDER PHOBIA

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Abstract — The role of disgust and contamination sensitivity in the development and
treatment of spider phobia was examined. It was predicted that spider phobics high
in disgust and contamination sensitivity have been more susceptible to evaluative
conditioning processes and, as a result, less often report traumatic conditioning
events and benefit less from exposure treatment than phobics low in disgust
sensitivity (Baeyens, Eelen, Crombez, & van den Bergh, 1992). As a group, spider
phobics (N = 46) were characterized by higher disgust sensitivity than nonphobic
control subjects (N = 28). However, phobics high in disgust sensitivity reported, if
anything, more conditioning events than low disgust sensitivity phobics. Treatment
effects of exposure were evident in both self-report measures and the behavioral
modality. These effects were comparable for high and low disgust sensitivity phobics.
Remarkably, high and low disgust sensitivity phobics did not differ with regard to the
perceived dirtiness of spiders. Even when the perceived dirtiness of spiders was used
as a classifying variable, no differences in acquisition history or treatment outcome
emerged between high and low groups. Thus, the findings lend no support to the
views that traumatic conditioning events are rare and that exposure treatment is less
successful in phobics who presumably have an evaluative learning background. The
methodological limitations of the present study are discussed.

INTRODUCTION

Ever since Watson and Rayner's (1920) "little Albert" study, researchers
have sought to explain the etiology of animal and other phobias in terms of
aversive classical conditioning. Typically, this has been taken to mean that
fear of a neutral stimulus (e.g., a dog) can be traced to the co-occurrence of
this stimulus with an highly aversive incident (e.g., being bitten by a dog).
In that case, the neutral stimulus (CS) acquires phobogenic properties
because it is perceived by the subject as a signal of an aversive event
(UCS).

Consistent with such signal learning interpretation of phobias are
retrospective clinical studies that show that approximately 50% of the
animal phobics do attribute their complaints to UCS-like incidents (Öst,
1985; Merckelbach, Arntz, & de Jong, 1991). Additionally, laboratory
studies of Öhman and co-workers (Öhman, 1986) indicate that it is possible
to induce in normal subjects electrodermal "fear" reactions to pictures of
spiders and snakes (CSS) by pairing these pictures with aversive UCSs
(i.e., electric shocks).

Baeyens and colleagues (see e.g., Baeyens, Eelen, van den Bergh,
& Crombez, 1989; Baeyens, Eelen, Crombez, & van den Berg, 1992)
argue that signal learning is but one type of aversive classical conditioning
that may occur (see also van den Hout & Merckelbach, 1991). More
specifically, they propose that classical conditioning may take the form of
evaluative learning and that it is evaluative learning that plays a crucial
role in the etiology of some animal phobias.

Laboratory examples of evaluative learning have been extensively
described by Levey and Martin (e.g., 1987). These authors demonstrated
that subjects' evaluation of neutral pictures (Cs) can be strongly and
permanently influenced by pairing these pictures with positively or nega-
tively evaluated pictures (UCSs). During this evaluative conditioning, the
neutral stimulus acquires the affective qualities of the UCSs without the
subject being aware of this "hedonic shift," or without the subject being
able to verbalize the systematic co-occurrence of neutral stimuli and UCSs
(see but see Davey, 1992b). Thus, the neutral stimulus is not regarded as a
signal of an impending UCS, but becomes intrinsically aversive.

Animal phobias that rely on evaluative learning can be expected to
have three characteristics: the phobic object (CS) is intrinsically aversive
(e.g., is associated with dirt rather than danger), the phobic person is
unable to trace this aversiveness of the CS to painful UCS events and the
aversiveness is resistant to extinction (i.e., cannot be modified by exposure
treatment).

As for the first characteristic, Baeyens et al. (1992) refer to a recent
study of Matchett and Davey (1992; see also Davey, 1992a). This study
showed that in normal subjects, fear of small animals (e.g., spiders, rats,
& snakes) is positively associated with disgust and contamination sensitivity
(as indexed by a questionnaire measuring food rejection; Rozin, Fallon,
& Mandell, 1984). Findings that point in the same direction were reported
by Bennett-Levy and Marteau (1984) and Merckelbach, van den Hout,
and van der Molen (1987). In both studies, normal subjects' fear of small
animals was found to be related to specific qualities that are attributed to
these animals (e.g., sliminess, ugliness etc.).

As for the second characteristic of evaluative learning (i.e., the absence
of traumatic conditioning events), it has to be noted that a number of
animal phobics studied by Öst (1985) and Merckelbach et al. (1991) were,
indeed, unable to recall specific UCS incidents and ascribed their fear to
vicarious learning or exposure to negative information about the phobic
object. Etiological mechanisms such as vicarious and informational learning can readily be accommodated by an evaluative conditioning approach, though the possibility that these mechanisms represent subtle forms of signal learning can not be excluded.

By and large, exposure treatment of animal phobias yields good short-term and long-term outcome results (Öst, 1989; Arntz & Lavy, in press; Merckelbach, de Jong, & Arntz, 1990). At first sight, this is difficult to reconcile with the third characteristic of evaluative learning, namely the alleged resistance to extinction of negative CS evaluations. Still, it may well be that only the subgroup of animal phobics with an evaluative learning background are characterized by a relatively poor treatment outcome. In an impressive series of laboratory studies, Baeyens et al. (1989; see also Baeyens, Crombez, van den Bergh, & Eelen, 1988) found evidence to suggest that conditioned evaluative reactions are resistant to mere exposure, but can be changed by counter-conditioning manipulations.

The present study was undertaken in order to explore whether (some) spider phobics display evaluative conditioning characteristics. The following issues were examined. Firstly, is disgust and contamination sensitivity associated with spider phobia, i.e., do spider phobics score higher on a measure of disgust and contamination sensitivity than nonphobic control subjects? Secondly, assuming that a person with high disgust sensitivity is more susceptible to evaluative information concerning spiders, do spider phobics high on disgust and contamination sensitivity report less traumatic UCS experiences and are they more difficult to treat with exposure compared to spider phobics low on disgust and contamination sensitivity?

METHOD

Subjects

The nonphobic control group consisted of 33 female subjects, recruited as unpaid volunteers. They were family members or friends of university employees. The control group was similar to the phobic group with respect to age (see below) and was matched on educational level. The phobic group consisted of 46 female spider phobics. All subjects met DSM-III-R criteria for simple phobia. Mean age was 28.9 years (range: 17–57 years). Mean (self-reported) onset age of the phobic complaints was 6.7 years (S.D. = 4.2). The average score on the Spider Phobia Questionnaire (SPO; Klorman, Weerts, Hastings, Melamed, & Lang, 1974; see below) before treatment was 21.7 (S.D. = 4.9), a score that comes close to the scores that were reported by Fredriksen (1983) and Merckelbach, Arntz, Arrindell, and de Jong (1992) for their phobic samples. Subjects participated in the study in return for “free” treatment.
Assessment and procedure

Control subjects were invited to complete the SPQ, a 31-item self-report instrument that measures fear of spiders (range: 0–31) and a 24-item disgust and contamination sensitivity questionnaire focusing on food rejection tendencies (DIS; range: 24–216; Rozin, Fallon, & Mandel, 1984; Matchett & Davey, 1991). Phobic subjects also completed the SPQ and the DIS. To evaluate the stability (i.e., test–retest reliability) of the DIS, a subgroup of phobics (N = 28) completed this questionnaire before and several months after treatment. Information with regard to the perceived dirtiness and dangerousness of spiders was derived from the Spider Belief Questionnaire (SBQ; see article by Arntz, Lavy, van den Berg, & van Rijsoort; this issue) that phobic subjects completed. Two SBQ items were used in the present analyses: one item (SBQ 15) asks for the dirtiness of spiders (0% = “not at all,” 100% = “very much”) and a second item (SBQ 05) asks whether spiders tend to attack (idem). Additionally, phobic subjects had to carry out a Behavioral Approach Task (BAT). The subjects were seated in a comfortable chair in a dimly lit, sound attenuated room. A large table was located in front of the subjects. A movable glass jar containing a live spider was placed at the far end of the table. Subjects held a string connected to the glass jar in their hand and were instructed to pull the jar as nearby as they could tolerate. BAT performance was coded using a 13-point scale ranging from 0 (“distance between subject and spider more than 3 m”) to 12 (“spider on hand”).

Next, phobic subjects underwent exposure treatment of the type described by Öst (1989). This session lasted for 2 h and contained elements such as hierarchically structured confrontation with spiders, modeling by therapist, encouragement to interact with the spider etc. Immediately after the treatment, subjects again completed the SPQ, the SBQ and carried out the BAT. After one week, subjects returned to the laboratory and SPQ, SBQ, and BAT were obtained for a third time. Following this, subjects were interviewed about the origins of their complaints. The interview was structured and interview items were taken from the Phobic Origin Questionnaire (POQ) developed by Öst and Hugdahl (1981). That is to say, during the interview, the following “pathways to fear” (Rachman, 1977, 1990) were tapped: modeling experiences (2 items: observing close family members and/or others reacting fearfully to spiders), informational learning (2 items: hearing negative information about spiders on T.V. and/or from other people) and conditioning incidents (1 item: experiencing a painful event in connection with spiders). Answers to the items were categorized on the basis of a two-fold classification (“pathway present” vs. “pathway absent”). Subjects were only assigned to a “pathway” if they were able to provide a detailed description of at least one relevant (modeling,
The role of evaluative learning informational learning and/or conditioning) experience. Following the interview, a second exposure session was given. The session lasted for about 2 h. Finally, SPQ, SBQ and BAT measures were obtained for a fourth time.

Design and data analysis

SPQ and DIS scores of nonphobic and phobic subjects were compared with t-tests. The stability of the DIS score in the phobic subgroup was assessed with a Pearson p-m correlation. To examine the effect of disgust sensitivity on phobic etiology and treatment outcome, two groups of phobics were formed, using the median split method: phobics high in disgust sensitivity and phobics low in disgust sensitivity. Chi-square tests were carried out in order to examine whether the two groups differed with regard to the POQ derived "pathways to fear". To evaluate treatment effects, separate 2 (group) × 4 (time: before first treatment session; after first treatment session; before second treatment session; after second treatment session) analyses of variance (ANOVAs) were performed on SPQ, SBQ items (15 and 05), and BAT-scores. The time factor was a repeated measure and was Greenhouse–Geisser corrected.

RESULTS

Disgust sensitivity in control and phobic subjects

Mean SPQ score in the control group was 4.9 (range: 0–18). There were 5 out of 33 control subjects (15%) who had a SPQ score in the subclinical range (SPQ>10). The records of these subjects were excluded from further analyses, leaving 28 subjects in the control group. Figure 1 shows mean SPQ and DIS scores for this control group as well as the SPQ and DIS of the phobic group. As expected, phobic subjects had higher SPQ scores than control subjects, the means being 21.7 and 3.1, respectively (t(72) = 22.6, p ≤ 0.001). The two groups did also differ with regard to disgust sensitivity, with phobics having lower DIS scores (reflecting higher disgust sensitivity) than normals (114.0 and 136.8, respectively, t(72) = 2.9, p ≤ 0.01).

Stability of disgust sensitivity scores

A subgroup of 28 phobic subjects completed the DIS twice: before treatment and several (between 2 and 6) months after treatment. Mean scores were 123.7 (S.D. = 31.8) and 120.5 (S.D. = 36.5), respectively. The Pearson correlation between the scores thus obtained was .84 (p ≤ 0.001), which suggests that the DIS possesses good test–retest stability.
FIG. 1. Mean SPQ and DIS scores of phobic subjects ($N = 46$) and nonphobic control subjects ($N = 28$).

**Pathways to fear**

On the basis of the median split performed on the DIS, phobic subjects were allocated to a high or a low disgust group. The high disgust group ($N = 23$) had a mean DIS score of 86.8 (S.D. = 18.1); the low disgust group ($N = 23$) had a mean DIS score of 141.3 (S.D. = 20.9). Table 1 shows the frequency of modeling, informational learning experiences and conditioning experiences reported in the high and low disgust phobics. Chi-square tests indicated that the groups did not differ with respect to modeling experiences mediated by close family members or others.

| Table 1. Frequency of Modeling Experiences, Informational Learning, and Conditioning Incidents in High ($N=23$) and Low ($N=23$) Disgust Phobics |
|---------------------------------|--------|--------|
| Disgust Phobics                 | Low    | High   |
| Modeling 1                     | 10(44) | 7(30)  |
| Modeling 2                     | 12(52) | 11(48) |
| Informational learning 1       | 14(61) | 14(61) |
| Informational learning 2       | 12(52) | 9(39)  |
| Conditioning                   | 7(30)  | 13(57) |

Percentages are given between parentheses.
(modeling 1 and 2, respectively) or informational learning experiences mediated by for example, TV (informational learning 1) or mediated by other people (informational learning 2). High disgust phobics tended to report more often conditioning incidents than low disgust phobics (Chi-square (1) = 3.2, \( p = 0.07 \)), a finding which is incompatible with the hypothesis discussed above.

_Treatment outcome_

Two subjects (one in the high disgust group and one in the low disgust group) were deleted from the analyses that are presented below because they failed to return for the second treatment session. Figures 2a–d depict the SPQ, SBQ (items 15 and 05) and BAT scores of the high disgust (\( N = 22 \)) and low disgust (\( N = 22 \)) phobics before and after treatment sessions. A 2 (group) × 4 (time) ANOVA performed on the SPQ yielded a main effect of time (\( F(3, 126) = 117.2, p \leq 0.001 \)), due to a decline of SPQ scores as a result of treatment. A significant group × time interaction (\( F(3, 126) = 3.0, p = 0.05 \)) revealed that this treatment effect was modulated by group: as can be seen in Figure 2a, the reduction in SPQ over sessions was greater in the low disgust than in the high disgust group. However, high and low disgust subjects ended up with comparable SPQ scores (i.e., SPQ 4), the post-treatment means being 11.0 (S.D. = 5.6) and 9.9 (S.D. = 7.6), respectively (\( t(42) \approx 1.0 \)).

Figure 2b shows the mean SBQ scores concerning the perceived dirtiness of spiders. The only effect reaching significance was a main effect of time/ treatment (\( F(3, 126) = 35.6, p \leq 0.001 \)). A t-test made clear that there were no initial (i.e., pretreatment) differences between the two groups with respect to this SBQ item (\( t(42) \approx 1.0 \)). The Pearson correlation between DIS and the pretreatment dirtiness score was .10 (\( p = .26 \)).

Mean scores on the SBQ item "if you are confronted with a spider, how much do you believe that the spider will attack you?" are shown in Figure 2c. Except for a significant time/treatment effect (\( F(3, 126) = 18.9, p \leq 0.001 \)), no further significant main or interaction effects emerged. There were no pretreatment differences between high disgust and low disgust phobics on this SBQ item (\( t(42) \approx 1.0 \)).

A 2 (group) × 4 (time) ANOVA performed on the BAT data (see Figure 2d) yielded, again, a significant time/treatment effect (\( F(3, 126) = 169.7, p \leq 0.001 \)). No further effects attained significance.

_Dirtiness as classifying variable_

As disgust sensitivity did not covary with dirtiness-ratings of spiders (SBQ 15), a set of subsequent analyses was carried out. A median split
FIG. 2.
was now performed on the pretreatment dirtiness ratings. This resulted in a low and a high "dirtiness" group, the means being 42.8 (SD = 31.7) and 98.9 (SD = 2.9). Next, acquisition history (i.e., pathways to fear) and the treatment effects of the two groups were compared. Basically, the pattern of results was similar to that found for high and low DIS phobics. Thus, the groups did not differ with regard to the reported frequency of modeling, informational learning or conditioning events (all Chi-squares ≤ 2.5, p ≥ 0.10). Neither were there significant group effects or group × time/treatment interactions in the ANOVAs of the SPQ, BAT or SBQ (item 05) data (all Fs ≤ 1.5, p ≥ 0.15). The only effects reaching significance were the time/treatment main effects.

DISCUSSION

Baeyens et al. (1988, 1992) hypothesized that phobias with an evaluative learning background are characterized by the inability to recall painful UCS incidents and an intrinsic dislike of the phobic CS that is not affected by CS exposure. In their words (Baeyens et al., 1992; p. 134):

"... some animal phobias clearly better fit with the evaluative learning than with the signal learning conceptualization (Matchett & Davey, 1991). Phenomenologically, the phobic object may be feared and/or disliked for itself rather than signalling the occurrence of a negative event; animal phobias often present themselves with a (supposed) acquisition history without detectable contingency awareness and are often extremely resistant
to corrective verbal information concerning stimulus contingencies; finally, exposure therapy (extinction procedure) is often not successful in altering the "intrinsic" negative valence of the phobic object".

In their own laboratory experiments, Baeyens and associates found strong evidence to suggest that conditioned evaluations are resistant to extinction and may occur without the subject being aware of their origins (but see Davey, 1992b). The present study attempted to explore the role of evaluative learning and its alleged characteristics in a clinical context. As it is difficult, if not impossible, to carry out a prospective study in which phobias with an evaluative conditioning background are compared to those with a signal learning background, the present study had to rely on an indirect test of the hypotheses put forward by Baeyens and colleagues. More specifically, it was assumed that an evaluative learning pathway to phobia would be more common among high disgust sensitivity subjects than among low disgust sensitivity subjects. Following this line of reasoning, it was predicted that high disgust sensitivity subjects would less often recall aversive UCSs in their learning history and would benefit less from exposure treatment than low disgust sensitivity phobics. By and large, these predictions were not confirmed by the data. That is to say, phobics high in disgust sensitivity did not report less UCS-like conditioning incidents (or to use the Baeyens et al.'s terminology "contingency awareness") than phobics low in disgust sensitivity. If anything, the opposite was found to be true (see Table 1). Furthermore, both high and low disgust sensitivity phobics benefitted from exposure treatment. Strong treatment effects were evident in the behavioral (BAT) modality, but also in the subjective modality (SPQ; SBQ items). The decline in SPQ scores as a result of treatment was smaller in the high disgust than in the low disgust sensitivity group.

This is, of course, in line with the predictions that can be derived from Baeyens et al. (1988, 1992). It should be added, however, that the effect size was certainly not dramatic and that the two groups did not differ with regard to the post-treatment SPQ scores.

One could counter that disgust sensitivity is a problematic variable for reconstructing the conditioning pathway (i.e., evaluative vs. signal learning) on which a particular phobia is based. The fact that high disgust sensitivity was not reflected in high dirtiness ratings of spiders (SBQ 15) seems to strengthen this argument. However, even when dirtiness ratings were employed as classifying variable, no differences were found between "low" and "high" groups with respect to self reported learning history (i.e., recall of UCS events etc.) and treatment effects. Thus, to the extent that one is willing to believe that high disgust sensitivity or high dirtiness ratings reflect an evaluative conditioning pathway, the findings presented above do not support Baeyens et al.'s view on the relationship between evaluative conditioning, phobic symptomatology and treatment outcome.
The role of evaluative learning

The disgust and contamination sensitivity questionnaire (Rozin et al., 1984) employed in the present study proved to be a reliable measure. In addition, spider phobics, as a group, were found to have higher disgust sensitivity than normal control subjects. This is in line with the results reported by Matchett and Davey (1991). How does disgust and contamination sensitivity affect the development of spider phobia? One possibility is that disgust sensitivity operates via latent inhibition. Before the onset of their complaints, spider phobics with high disgust sensitivity may have avoided spiders and settings were spiders are likely to be encountered. As a result of this lack of familiarity with spiders, high disgust sensitivity subjects may have been more prone to subsequent conditioning processes (Davey, 1989; Doogan & Thomas, 1992). A second possibility is that high disgust sensitivity plays a role in the maintenance of spider fear. It may well be the case that high disgust sensitivity intensifies avoidance and thus reduces functional exposure to spiders.

Several limitations of the present study deserve comment. To begin with, acquisition history of spider phobics was evaluated with items derived from the POQ (Öst & Hugdahl, 1981). This instrument is retrospective in nature and consequently memory distortions, mood congruent recall effects etc. may undermine its validity. On the other hand, one has to admit that there is no ready alternative to the POQ (see Öst, 1991). Second, spider phobics in the present study were treated with the exposure procedure described by Öst (1989). It should be stressed that this procedure does not only contain exposure to the phobic object, but also modeling examples, encouragement and corrective information provided by the therapist. It cannot be ruled out that the latter elements had a counter-conditioning effect in phobics with high disgust sensitivity and (presumably) an evaluative learning background. Third, in the present study, short-term effects of exposure treatment were measured. Yet, it remains possible that disgust sensitivity affects long-term rather than short-term treatment outcome. Further studies should concentrate on this issue. Meanwhile, the current findings clearly demonstrates that, by and large, high and low disgust sensitivity phobics do not differ with regard to the short-term treatment outcome of exposure therapy. In passing it should be noted that this is in accordance with the results of de Silva (1988), who showed that it is possible to modify robust food aversions (i.e., a clear instance of an intrinsic dislike of the CS) in humans by graded exposure in vivo. In sum, then, the present findings and those of de Silva suggest that disgust (sensitivity) does not represent an obstacle to exposure treatment.

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REFERENCES


The role of evaluative learning


