

# Evaluative differential conditioning of disgust: A sticky form of relational learning that is resistant to extinction

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## Abstract

The present study sought to (a) test whether autonomic (i.e., electrodermal) and evaluative conditioning can be differentially established to verbal CSs, and (b) whether extinction procedures can reliably attenuate differential conditioned evaluative responding. Thirty undergraduates underwent a 10-min adaptation period followed by three consecutive conditioning phases: habituation, acquisition, and extinction. Conditioning involved participants viewing two semi-randomly presented words on a computer monitor. During acquisition, one word (CS+) was reliably paired 12 times with the UCS (pictorial stimuli depicting bodily mutilation), whereas the remaining word (CS−) was presented 12 times and reliably followed by neutral pictures (inanimate common objects). As predicted, electrodermal and evaluative responses during acquisition were of larger magnitude to the CS+ compared to the CS−. During extinction, participants continued to evaluate the CS+ as more disgusting relative to the CS−, whereas distress and fear-related emotional ratings attenuated across extinction trials. The implications of these findings for the modifiability of disgust-based evaluative responses in specific anxiety disorders will be discussed.

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Psychopathologists have used aversive Pavlovian (classical) conditioning preparations successfully to model pathological anxiety and fear by elucidating how involuntary and excessive maladaptive responses become associated with a wide range of otherwise innocuous bodily and

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environmental stimuli and events, including language (e.g., Forsyth & Eifert, 1996; Staats, 1968). Though a variety of accounts has been put forth to explain the processes involved, Pavlovian conditioning can be readily described in procedural terms: a previously neutral stimulus (NS), after having been paired in a contingency with an aversive unconditioned stimulus (UCS) that reflexively elicits an unconditioned response (UCR), will result in changes in the evocative functions of the NS such that, when presented in the absence of the UCS, it functions as a conditioned stimulus (CS) in evoking both subjective and autonomic conditioned responses (CRs) that we typically associate with fearful or anxious behavior (e.g., Forsyth, Daleiden, & Chorpita, 2000; Reiss, 1980). With suitable controls, such procedures can be used to reliably establish fear evoking and other emotive functions (e.g., disgust) to a wide range of stimuli (Olatunji, 2006; Olatunji, Lohr, Sawchuk, & Westendorf, 2005).

Evaluative conditioning represents a somewhat unique tradition within the human Pavlovian conditioning literature, where attention has been directed at the nature of transfer of affective value (i.e., like versus dislike) from a UCS to a previously NS (Levey & Martin, 1983, Part 1, 1987; Martin & Levey, 1985, 1987a, 1987b). Evaluative responses are considered basic and primitive to all evocative UCSs (Martin & Levey, 1987a, 1987b), and are akin to an immediate gut reaction of preference, such as like/dislike, good/bad, pleasant/unpleasant; reactions that often mediate phobic avoidance (e.g., Mulkens, de Jong, & Merckelbach, 1996; Olatunji et al., 2005). Unlike other forms of Pavlovian conditioning that are said to involve the learning of relations between stimuli (signal learning), evaluative conditioning is said to involve a holistic form of learning where the CS and UCS become fused or integrated (referential learning). In other words, the main difference between Pavlovian and evaluative conditioning is situated in the type of associations that are formed (Coppens et al., 2006). While the CS-UCS association in Pavlovian conditioning involves that the CS elicits the expectation of real UCS occurrence, evaluative conditioning involves a reference to the UCS without expectation of occurrence (De Houwer, Thomas, & Baeyens, 2001). The focus in evaluative conditioning, therefore, is on changes in the evaluation of the CS, not its signaling properties of the likelihood of a UCS (cf. Martin & Levey, 1987a, 1987b). This form of learning, in turn, is claimed to reflect an automatic non-cognitive process that is fundamental to all forms of human conditioning. As such, evaluative learning is thought to be more difficult to modify compared with most other forms of Pavlovian conditioning.

Though the conceptual tenets of evaluative conditioning are not without criticism (see Davey, 1994a, 1994b), several studies have shown that evaluative conditioning appears to occur without awareness of CS-UCS contingencies (e.g., Baeyens, Eelen, & Van den Bergh, 1990). Moreover, the basic phenomenon of evaluative conditioning has been reliably demonstrated across several stimulus modalities, spanning verbal and non-verbal stimuli, visual, auditory, and gustatory–olfactory modalities (e.g., De Houwer, Baeyens, Vansteenwegen, & Eelen, 2000; van Reekum, van den Berg, & Frijda, 1999). In examining boundaries of this phenomenon, Coppens et al. (2006) recently found that despite evidence of impaired fear conditioning, unilateral damage to the amygdaloid nuclear complex does not appear to impair evaluative conditioning. However, evaluative conditioning, though real, is fragile and often difficult to obtain reliably in the laboratory (Rozin, Wrzesniewski, & Byrnes, 1998).

Pavlovian conditioning is generally regarded as a potential risk factor for the development of various emotions, such as fear and panic (Forsyth, Palav, & Duff, 1999; Mongeluzi, Rosellini, Ley, Calderone, & Stock, 2003). Although it has been proposed that disgust may also be acquired via Pavlovian conditioning (Rozin & Fallon, 1987), a model of acquisition and maintenance of disgust based on evaluative conditioning has also been proposed

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