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Modulation of Affective Learning: An Occasion for Evaluative Conditioning?

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Two experiments assessed whether human affective learning is sensitive to occasion setting. The first experiment ($N = 18$) employed a within-subjects, sequential feature positive design (X → A+/A−). Modulation of blink startle, an index of affective learning, was larger during A+ than during A−, suggesting that participants had learned a modulatory relationship. Experiment 2 ($N = 32$) assessed whether the feature also acquired conditioned valence in a between-subjects design. One group received sequential feature positive training (X → A+/A−), and a second group was trained in a sequential feature negative design (X → A−/A+). Startle modulation during the feature was larger in the sequential feature positive group than in the sequential feature negative group. The results are interpreted to suggest the presence of modulated affective learning to the target concurrent with simple affective learning to the feature.

Key Words: affective learning; blink startle modulation; evaluative conditioning.

The learning of likes and dislikes, affective learning, occurs when the valence of a conditioned stimulus (CS) changes due to pairing with an unconditioned stimulus (US) (Hamm & Vaitl, 1996). The valence of the US determines the direction of the change in valence of the CS. An affectively neutral CS may acquire positive valence after pairing with an appetitive US or negative valence after pairing with an aversive US.

Research during the past few decades has provided evidence suggesting that affective learning is qualitatively distinct from the learning of expectancy associations (Baeyens, Eelen, & Crombez, 1995; Baeyens, Eelen, Van den Bergh, & Crombez, 1989; Martin & Levey, 1987). Baeyens *et al.* (1995), in their evaluative conditioning theory, proposed that affective learning may be controlled by a lower-order learning system, the Referential System, which is functionally distinct from the system that controls signal learning. In support of this conceptualization, Baeyens and his colleagues have found that, unlike signal learning, affective learning is not affected by the contin-

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gency of conditioned and unconditioned stimuli (Baeyens, Hermans, & Eelen, 1993), is resistant to extinction (Baeyens, Crombez, Van den Bergh, & Eelen, 1988; Baeyens *et al.*,1989; Baeyens, Crombez, Hendrickx, & Eelen, 1995), and does not require awareness of stimulus contingencies (Baeyens *et al.*, 1989; Baeyens, Eelen, & Van den Bergh, 1990).

The majority of studies cited in support of evaluative conditioning theory have utilized a picture–picture paradigm and more recently a flavor–flavor paradigm. Both procedures employ verbal ratings of stimulus valence as measures of affective learning. The picture–picture paradigm, which employs pictures of human faces as conditioned and unconditioned stimuli, has received extensive criticism (Field & Davey, 1997, 1998, 1999; Shanks & Dickinson, 1990). In this procedure, the experimenter matches conditioned stimuli with unconditioned stimuli based on their similarity. Such nonrandom pairing may be subject to selection bias, which may confound the results. In addition, the failure to counterbalance stimuli across participants may make it difficult to determine whether the stimulus characteristics or the associations between conditioned and unconditioned stimuli are responsible for the change in stimulus ratings. Moreover, it has been argued that the absence of an unpaired control condition makes it impossible to conclude that the results reflect associative learning (Field & Davey, 1997, 1998, 1999). In a reply, Baeyens, De Houwer, Vansteenwegen, and Eelen (1998) have argued that only a minority of the evaluative conditioning studies employed non-random CS–US assignment and that a within-subjects control is adequate to determine an associative link. However, it remains the case that the nature of the association, whether it exists between the CS+ and the US, the CS− and the US, or both, is undetermined (Field & Davey, 1998). Extending this idea, it has been suggested that effects obtained from evaluative conditioning studies do not represent associative learning at all but are instead mere artifacts of the evaluative conditioning paradigm (Field & Davey, 1999).

The flavor–flavor paradigm avoids some of the validity problems that plague the picture–picture paradigm as it employs a priori pairing of the conditioned stimuli with the unconditioned stimuli. In addition, the flavors that serve as the CS+ and as the CS− are perfectly counterbalanced across participants. In the standard flavor–flavor paradigm, two flavors are employed as conditioned stimuli that have been pre-rated as affectively neutral by an independent rating group. During acquisition, one of the flavors is presented concurrently with an aversive taste, whereas the second flavor is presented alone. After acquisition, participants are exposed to unpaired presentations of the two flavors and are required to rate how much they like/dislike each flavor. If the flavor that was paired with the aversive taste is rated as significantly more disliked than the unpaired flavor, this is accepted as evidence for a change in the valence of the paired flavor. Both paradigms remain, however, subject to criticism in that they fail to incorporate a concur-