

Addressing the specificity of affective startle modulation: fear versus disgust[☆]

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Abstract

Previous research is equivocal regarding whether startle reflex eyeblink is specifically sensitive to the emotion of fear, or is more generally influenced by the valence dimension of emotion. Thirty-five undergraduate participants (17 male) viewed 60 pictures from five affective categories (pleasant, neutral, fear, disgust-blood, and disgust-other). Bilateral eyeblink EMG responses to acoustic startle probes were assessed during 2/3 of picture presentations, and 1/3 of intertrial intervals. Left corrugator and levator EMG responses to no-startle pictures were also examined. Supporting an emotional valence model of affective startle modulation, the startle potentiation effect was not specific to fear materials. In fact, women, but not men, had larger startles during disgust compared with fear pictures. Both corrugator and levator EMG responses were greater to disgust than fear stimuli. These findings limit the generalizability of corrugator as an index of all negative emotions and extend evidence for the specificity of levator to disgust. © 2002 Elsevier Science B.V. All rights reserved.

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1. Introduction

The magnitude of the eyeblink startle response is robustly augmented during aversive compared with pleasant emotional states (e.g. Vrana et al., 1988; see reviews by Bradley et al., 1999; Fillion et al., 1998). This valence modulation of the startle reflex has been interpreted within a broader model of emotion, which conceptualizes emotion in terms of two independent dimensions: arousal and valence (e.g. Lang et al., 1990). Within this framework, startle is considered a protective response that is augmented during all negatively valent emotions. Indeed, early studies addressing the specificity of affective startle modulation demonstrated that startle was equally potentiated during fear and anger imagery (Cook et al., 1991; Hawk et al., 1992).

However, recent data on startle potentiation during fear and disgust support a model in which fear plays a dominant role. In a pair of studies (Balaban and Taussig, 1994), young adult participants were paid to view pleasant, neutral, fear-eliciting, and disgusting pictures. In both studies, startles were potentiated during fear stimuli, compared with disgust stimuli, even though disgust pictures were rated as equally arousing and more unpleasant than fear pictures. The authors tentatively concluded that it is predominantly fear, rather than the broader dimension of valence, that affects startle magnitude.

Subsequent work with affective pictures supports this interpretation. Preliminary reports of several studies suggest that startle is most clearly potentiated during fear/threat pictures (i.e. attacking animals and people), relative to other aversive picture categories (e.g. pollution, disgusting objects, injuries, and mutilated bodies; Bradley et al., 1999). Similarly, in a recent study (Hamm et al., 1997), low-fear women exhibited potentiated startle to threat-relevant materials but not mutilation slides, the latter of which were rated as more disgusting than fear-eliciting. Importantly, the high degree of emotional blending between fear and disgust among blood-injury fearful women precluded a more precise analysis of startle modulation in that group, bolstering Cook et al. (1991) suggestion that work on the specificity of startle might best be conducted among non-fearful or unselected samples.

Thus, the specificity of emotional startle modulation is unclear. Although startle is frequently considered a measure of general affective valence (e.g. Vrana et al., 1988; Lang et al., 1990), findings of fear-specific potentiation (Balaban and Taussig, 1994; Bradley et al., 1999) call this interpretation into question. For both theoretical (i.e. the relationship between emotion and startle) and practical reasons (e.g. stimulus selection and potential clinical utility), it is important to further address the specificity issue.

Disgust is a particularly interesting comparison emotion for evaluating valence versus fear-specific models. Disgust and fear have much in common. Both are negatively-valenced, highly-arousing, withdrawal-related emotions (for reviews, see Davidson et al., 2000; Lang et al., 1990, 1997; Woody and Teachman, 2000). Moreover, disgust is increasingly implicated in the anxiety disorders, particularly specific phobias and obsessive-compulsive disorder (Hamm et al., 1997; Woody and Teachman, 2000). In contrast, fear and disgust may differ in their neurobiology,

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