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Personality and Individual Differences 29 (2000) 1077–1082

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PERSONALITY AND  
INDIVIDUAL DIFFERENCES

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# The role of neuroticism in startle reactions to fearful and disgusting stimuli

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Received 23 July 1999; received in revised form 8 October 1999; accepted 22 November 1999

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## Abstract

It has frequently been observed that negative moods potentiate the startle reflex to unexpected, threatening stimuli. However, recent work from our laboratory suggests that this effect relates primarily to the emotion of fear or anxiety, while stimuli which evoke powerful feelings of disgust can in some circumstances inhibit the startle reflex. In this study we reanalyse data from 42 subjects in whom eye-blink amplitudes to an auditory probe were measured whilst viewing emotionally arousing film clips. Classifying the negative film clips into separate categories of “frightening” vs “disgusting” revealed a previously undetected interaction with EPQ Neuroticism. High N subjects showed greater startle reactions than low N subjects under fearful conditions but low N subjects showed greater startle when disgust was evoked. This suggests that Neuroticism may increase vigilance where evasive action is possible but promote emotional blunting when escape is not an option. © 2000 Elsevier Science Ltd. All rights reserved.

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## 1. Introduction

The startle reflex consists of a standard pattern of behaviours and physiological changes that occurs in both humans and animals in reaction to a sudden, aversive stimulus such as a pistol shot. For experimental purposes, the most easily measured component of the startle reflex is eye-blink amplitude, and this is known to be potentiated when subjects are probed during a

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state of anticipatory anxiety (Grillon, Ameli, Foot & Davis, 1993). Trait fearfulness has also been shown to potentiate eye-blink responses during viewing of aversive (as compared to neutral) slides (Cook, Davis, Hawk, Spence & Gautier, 1992). Therefore it might have been expected that subjects high on Neuroticism would also show greater startle increments to aversive stimuli than low N subjects. Corr, Kumari, Wilson, Checkley and Gray (1997) and Corr et al. (1995) report findings that are partly consistent with this hypothesis, using slides depicting unpleasant scenes such as mutilated bodies, angry faces and threatening weapons, and Cloninger's (1988) "Harm Avoidance" scale, which is a measure of trait anxiety. However, a study of the relationship between personality and startle modulation using emotionally toned film clips (Kumari et al., 1996) failed to find any relationship between Eysenck's personality factors and affective modulation of eye-blink amplitudes.

A possible explanation of this negative finding invokes the distinction between fear and disgust. Balaban and Taussig (1994) found that, although startle reflexes were enhanced by exposure to negatively affective slides, the effect was limited to slides that were frightening. Blinks during disgusting pictures did not differ from the neutral condition. A similar distinction between the effects of fearful vs disgusting stimuli was found in our own laboratory using film clip material (Kaviani, Gray, Checkley, Kumari & Wilson, 1999). Of the two unpleasant film clips tested, a scene from the film *Miller's Crossing*, in which gangsters drag a terrified victim into a forest in order to shoot him, produced reliable startle potentiation, whereas a gruesome, though clinical, demonstration of toe surgery taken from a medical education film showed a capacity sometimes to reduce startle responses. Affective ratings of the two clips revealed that the gangster clip was primarily rated as "anxiety/threat-evoking", while the toe surgery sequence was rated by most subjects as "disgusting". Kaviani et al. discussed the differing reaction to these two films in survival terms. They suggested that when the environment presents a threat that might be avoided by rapid evasive action (e.g. a predator or gunman stalking us in a forest) it is adaptive for vigilance to be sharpened (hence startle potentiation). However, when there is no choice but to endure an unpleasant circumstance, and indeed when sudden movement might make matters worse (as in undergoing a surgical procedure), then some form of emotional "blunting" is appropriate (hence startle inhibition).

In the light of this distinction in film stimuli we looked back on our previous data (Kumari et al., 1996) to see if relationships with Neuroticism may have been obscured. We had used four negative film sequences, two of which intuitively seemed to evoke fear, and two disgust. This study examines the possible interaction between N and startle responses under these different emotional conditions. The hypothesis was that N would relate to potentiated startle under conditions of fear but not under conditions of disgust.

## **2. Method**

Subjects were derived from the sample of 42 normal volunteers (equal males and females) tested by Kumari et al. (1996). They were divided into low and high N according to scores on the Eysenck Personality Questionnaire (EPQ) (Eysenck & Eysenck, 1975). Splitting the original group at the median N score (and excluding those who scored exactly at the median of 11)

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