



## Processing of task-irrelevant natural scenes in social anxiety

Jun Moriya<sup>a,b,c,\*</sup>, Yoshihiko Tanno<sup>d</sup>

<sup>a</sup> Japan Society for the Promotion of Science, Japan

<sup>b</sup> Hiroshima University, Japan

<sup>c</sup> Ghent University, Belgium

<sup>d</sup> The University of Tokyo, Japan

### ARTICLE INFO

#### Article history:

Received 15 February 2011

Received in revised form 25 May 2011

Accepted 30 May 2011

Available online 21 June 2011

#### PsychINFO classification:

2340 Cognitive Process

2360 Motivation & Emotion

#### Keywords:

Social anxiety

Perceptual load

Natural scene

Attentional control

Repetition priming

Flanker task

### ABSTRACT

In this study, by manipulating perceptual load, we investigated whether socially anxious people process task-irrelevant, non-emotional, natural scenes. When attention was directed to letters and perceptual load was low, task-irrelevant natural scenes were processed, as evidenced by repetition priming effects, in both high and low socially anxious people. In the high perceptual load condition, repetition-priming effects decreased in participants with low social anxiety, but not in those with high social anxiety. The results were the same when attention was directed to pictures of animals: even in the high perceptual load condition, high socially anxious participants processed task-irrelevant natural scenes, as evidenced by flanker effects. However, when attention was directed to pictures of people, task-irrelevant natural scenes were not processed by participants in either anxiety group, regardless of perceptual load. These results suggest that high socially anxious individuals could not inhibit task-irrelevant natural scenes under conditions of high perceptual load, except when attention was focused on people.

© 2011 Elsevier B.V. All rights reserved.

### 1. Introduction

People focus on goal-relevant information by top-down processing, which controls where, how, and to what people pay attention. However, task-irrelevant stimuli are not always effectively ignored. In some cases, task-irrelevant distractors interfere with goal-directed attention, and are unintentionally processed (Eriksen & Eriksen, 1974; Gatti & Egeth, 1978). Interference from task-irrelevant distractors is influenced by attentional control (Forster & Lavie, 2007). Individuals with poor attentional control experience greater distractor interference than those with good attentional control. Considering individual differences in attentional control is an important step in revealing the nature of interference effects from task-irrelevant distractors.

Anxiety is clearly related to poor attentional control (Eysenck, Derakshan, Santos, & Calvo, 2007; Moriya & Tanno, 2008). According to the attentional control theory proposed by Eysenck et al. (2007), anxiety increases the influence of bottom-up processing and decreases that of top-down processing on automatic detection and processing of task-irrelevant stimuli (see Derakshan & Eysenck, 2009 for a recent review). Highly anxious people cannot suppress salient task-irrelevant stimuli. Eysenck et al. (2007) proposed that attentional control in people with high anxiety is

impaired when task demands on processing resources are high. While many previous studies revealed impaired attentional control in anxious individuals, few studies have investigated the processing of task-irrelevant stimulus or manipulated task demands on processing resources.

The perceptual load theory proposed by Lavie (1995, 2005, 2010) is useful for investigating the processing of task-irrelevant stimuli and the effects of task demands. When task-relevant stimuli are presented with other task-irrelevant distractors, people remain focused on the perception of the task-relevant stimuli. However, people are distracted by task-irrelevant stimuli in certain cases, for example when there are few task-relevant stimuli or the task-irrelevant distractors are salient. In contrast, when there are many task-relevant stimuli or the task-irrelevant distractors are not so salient, people are not distracted by the task-irrelevant stimuli. According to the perceptual load theory, people have limited resources and all stimuli are automatically processed until attentional resources are depleted. When task demands are low, such as a condition with a few task-relevant stimuli, there are spare attentional resources and people use them to process task-irrelevant stimuli. However, when task demands are high (e.g. many task-relevant stimuli must be processed), there is no spare capacity for processing task-irrelevant stimuli. In this case, perceptual load is defined as the number of task-relevant stimuli or different-identity items (Lavie, 1995, 2005; Lavie & de Fockert, 2003). Extra attentional resources are allocated to task-irrelevant distractors when just one or very few relevant stimuli are presented (low perceptual load). On the other hand, attentional resources

\* Corresponding author at: Henri Dunantlaan 2, B-9000 Gent, Belgium. Tel.: +32 9 264 64 62; fax: +32 9 264 64 89.

E-mail address: [Jun.Moriya@UGent.be](mailto:Jun.Moriya@UGent.be) (J. Moriya).

are exhausted as the number of task-relevant stimuli or different-identity items increases (high perceptual load). Therefore, processing task-irrelevant distractors weakens under conditions of high perceptual load.

The perceptual load theory proposes that a high perceptual load diminishes perception of task-irrelevant stimuli. However, according to the attentional control theory (Eysenck et al., 2007), interference from task-irrelevant distractors in anxious individuals might be observed when there is increased demand on processing resources because attentional control is impaired. In other words, impaired attentional control and enhanced sensitivity due to anxiety might increase interference from task-irrelevant distractors under conditions of high perceptual load. Considering the limited attentional resources, interference from task-irrelevant stimuli in anxious people might occur at the cost of target perception. When task demands are high, such people might have difficulty controlling their attention and may not be able to allocate sufficient attentional resources to the target. Instead, they might deploy the remaining resources to the task-irrelevant stimuli.

A few previous studies have investigated the effect of anxiety on processing of task-irrelevant stimuli by manipulating perceptual load (Bishop, 2009; Bishop, Jenkins, & Lawrence, 2007; Moriya & Tanno, 2010; Sadeh & Bredemeier, 2011). Moriya and Tanno (2010) investigated the processing of non-emotional task-irrelevant letters by manipulating perceptual load using an adapted flanker task (Lavie & Cox, 1997). Participants provided speeded choice responses to a target letter presented at the center of the screen while attempting to ignore a distractor letter presented in the periphery. Perceptual load was manipulated by varying the number of different-identity letters presented in the center. The identity of the peripheral task-irrelevant distractors could be either compatible with the target (i.e., the same as the target) or incompatible (i.e., an alternative target). When participants processed task-irrelevant distractors, the reaction times (RTs) in the incompatible condition were longer than those in the compatible condition (Eriksen & Eriksen, 1974). Moriya and Tanno (2010) showed that, in the low perceptual load condition, all participants processed the task-irrelevant stimuli, and RTs in the incompatible condition were longer than in the compatible condition. Moreover, even in a high perceptual load condition, participants with high social anxiety processed the task-irrelevant stimuli. These results suggest that attentional resources are allocated to task-irrelevant distractors in people with high anxiety even when perceptual load is high.

Bishop et al. (2007) designed an fMRI task in which a letter was superimposed on task-irrelevant fearful or neutral facial expressions. They manipulated perceptual load by varying the number of task-relevant letters. The behavioral results revealed that task-irrelevant faces interfered with the performance of high-anxiety participants under high perceptual load; in other words, the highly anxious participants had longer RTs and made more errors than the low socially anxious participants in the high perceptual load condition (for different results in neurological data, see the General Discussion section). This suggests that anxious participants allocate attentional resources to task-irrelevant facial expressions even under conditions of high perceptual load.

Previous studies have investigated the effect of task-irrelevant stimuli in anxious people by using letters or faces as distractors. Considering that highly anxious people routinely process task-irrelevant stimuli, one can reasonably assume that they will also process task-irrelevant natural scenes, which are ecologically valid stimuli. Moreover, the feature integration theory (Treisman & Gelade, 1980; Wolfe, Cave, & Franzel, 1989) posits that stimulus features such as lines, colors, and orientation are processed early, automatically, and in parallel. Processing complex natural scenes, which include many features, might require more attention than processing letters. It is unclear whether anxious people process complicated, task-irrelevant, non-emotional natural scenes in both low and high perceptual load conditions.

This study investigates whether socially anxious people process task-irrelevant natural scenes under conditions of high perceptual load. We focus on social anxiety because previous research has shown

that social anxiety is more strongly related to impaired attentional control than other types of anxiety or depression (Moriya & Tanno, 2008). Therefore, in this study, we seek to examine whether people with poor attentional control suppress task-irrelevant distractors.

Eysenck et al. (2007) propose that processing task-irrelevant stimuli in individuals with high social anxiety might be observed when task demands on processing resources are high. Therefore, we hypothesize that interference from task-irrelevant stimuli would be observed when high socially anxious people categorized stimuli in a high perceptual load condition. We also hypothesize that both high and low socially anxious people would categorize task-irrelevant natural scenes in the low perceptual load condition.

## 2. Experiment 1

In Experiment 1, we investigated whether socially anxious individuals processed task-irrelevant natural scenes when their attention was directed to non-natural scenes (i.e., letters). To this end, we used a repetition priming task and manipulated perceptual load according to Lavie, Lin, Zokaei, and Thoma (2009). In this task, stimuli are presented in an initial display (i.e., prime display), and stimuli in a subsequent display (i.e., probe display) are either repeated or non-repeated stimuli (intermixed). The repeated stimuli in the probe display are processed more rapidly than the non-repeated stimuli, a phenomenon known as repetition priming (Forster & Davis, 1984). Processing the stimulus in the prime display enhances target categorization in the probe display, even if the stimulus in the prime display is a task-irrelevant distractor. In other words, whether task-irrelevant natural scenes in the prime display are categorized is measured by facilitation priming in categorizing the natural scene in the probe display.

As described in the perceptual load theory (Lavie, 2005), the extra attentional resources in the low perceptual load condition should lead to repetition priming for the task-irrelevant natural scenes in both high and low socially anxious participants; that is, we hypothesized that RTs to repeated stimuli (i.e., primed condition) would be shorter than those to non-repeated stimuli (i.e., unprimed condition). In addition, the attentional control theory (Eysenck et al., 2007) predicts that high socially anxious people will still be unable to inhibit processing of task-irrelevant distractors in the high perceptual load condition due to their impaired attentional control. Therefore, we hypothesized that in the high perceptual load condition, repetition priming will be observed in highly socially anxious people, whereas repetition priming will be reduced or not observed in low socially anxious people.

### 2.1. Method

#### 2.1.1. Participants

The participants were 43 undergraduate students aged 18 to 21 (22 males and 21 females) who provided informed consent. All had normal or corrected-to-normal vision. Participants completed the Japanese version of the Brief Fear of Negative Evaluation Scale (BFNE; Leary, 1983; Sasagawa et al., 2004), which assesses apprehension related to others' negative evaluations and reflects the degree of social anxiety. The scale consists of 12 items rated on 5-point Likert scales. A previous study indicated that the average scale score in university students is 43.8 (Moriya & Tanno, 2008). Participants were divided into high and low social anxiety groups based on a median split of BFNE scores. The 20 participants who scored 42 and above were placed in the high social anxiety group; the 20 participants who scored 40 and below were placed in the low social anxiety group; the remaining 3 participants who scored the median value of 41 were excluded. All participants also completed the Japanese versions of the State-Trait Anxiety Inventory (STAI; Shimizu & Imae, 1981; Spielberger, Gorsuch, & Lushene, 1970) and the Self-Rating Depression Scale (SDS; Fukuda & Kobayashi, 1973; Zung, 1965) used to measure the degree of state, trait anxiety, and depression.

Download English Version:

<https://daneshyari.com/en/article/920184>

Download Persian Version:

<https://daneshyari.com/article/920184>

[Daneshyari.com](https://daneshyari.com)