The Effect of Fearful Emotion on Selective Visuo-spatial Attention

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INTRODUCTION

The modulation of selective visuospatial attention by fearful emotion is evolutionarily adaptive. In the present study, a modified version of the spatial cueing task was used to investigate the effect of fearful emotion on selective spatial attention. After invalid or valid location cued by a neutral or angry face, participants need to indicate the location of a target square. The results showed that the validity effect is mediated by emotion of the face. More specifically, response time is faster for the invalid condition compared with the valid condition in the fearful condition. These data suggested that fear emotion enhanced selective attention by ignoring irrelevant cueing information, which provides evidence for the effect of emotion on top-down spatial attention network.

KEYWORDS

Selective spatial attention, Top-down attention, Emotion, Fear, Spatial cueing task

METHOD

Participants

A total of 19 student from a cognitive research class in Western University were recruited as participants. The data from 18 students were included in the analyses. Data from one participant was excluded from final analyses due to irregularity (almost no corrected responses for invalid trials). Descriptive data of gender and age was not specified.

Materials

Modified Spatial Cueing Task. The spatial cueing task is a modified vision to the study done by Vogt et.al (2008). The experiment was performed on LCD monitor and the experimental procedure was programmed by E-Prime software. All stimuli were presented against a black background. Two white rectangles (5.29 cm high × 2.59 cm wide) were placed on both side of the white fixation cross (5 mm high). A black square (1 cm) was served as a target for this task and placed 9.2 cm away from the fixation point in the white rectangles. Face pictures (fear or neutral) were presented as the same size of the rectangles. If the stimulus was presented at the same side with the target, it would be served as a valid cue. If the stimulus was presented at the opposite side, it would be served as an invalid cue. Reaction times were recorded in milliseconds.

Facial Picture Stimuli. Face picture from Chinese Facial Affective Picture System (Gong, Huang, Wang, & Luo, 2011) was used in this study for inducing emotion. A total of 148 angry faces and neutral faces were used to induce fearful and neutral emotion respectively. Both conditions have equal amounts of pictures for both genders. Neutral & Angry face pictures have acceptance rates over 70%.

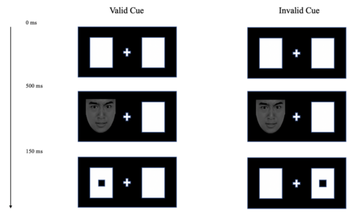

Figure 1. The example flowchart of the experiment procedure for valid and invalid condition with angry male face.

RESULTS

Table 1
Mean reaction times (in ms) and corrected answer counts with their standard deviations (SD) for each combination of emotion (fear or neutral) and validity (invalid or valid) condition.

	Reaction Time (ms)		Corrected Response (times)	
	M	*SD*	*M*	*SD*
Fear-Valid	355.01	61.60	39.50	0.62
Fear-Invalid	344.81	57.97	36.70	4.96
Neutral-Valid	357.05	40.20	39.20	1.56
Neutral-Invalid	364.13	61.02	36.80	6.48

Table 2
Paired t-test results between different conditions with 95% confidence intervals.

		p	95% *CI*	
			Lower Bound	Upper Bound
Fear vs. Neutral	Valid	.201	-49.905	11.291
	Invalid	.861	-26.282	22.190
Invalid vs. Valid	Fear	.072	-21.376	.998
	Neutral	.402	-10.293	24.437

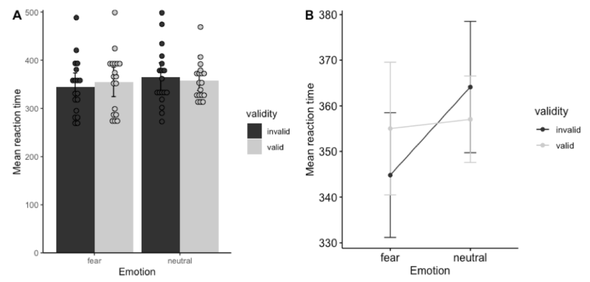

Figure 2. Mean response times (in ms) for each combination of emotion and validity conditions. (A) Bar graph of the mean reaction times for each condition with standard deviation. (B) An interaction effect of emotion and validity on reaction time with standard deviation.

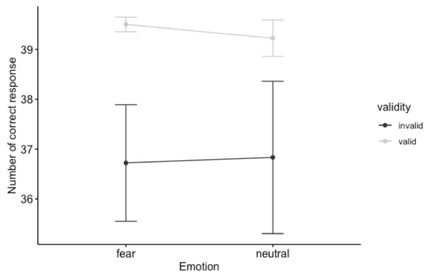

Figure 3.. Mean corrected response counts on each combination of emotion and validity conditions with standard deviation.

DISCUSSION

- The present study provided evidence that fearful emotion enhancing selective visuospatial attention.
- Reaction time difference between invalid and valid condition was larger in fearful condition than neutral condition, which is consist with Easterbrook's cue utilization theory (1959).
- However, inconsistent with previous literature (Finucane, 2011), main effect of emotion was not found in the present study.
- Although there was a trend that mean reaction time for fearful condition is faster than neutral condition, it did not reach statistical significance.
- There is also no main effect of validity on reaction time. However, participants did have more corrected response in valid condition than invalid condition.

CONCLUSION

In summary, fearful emotion affects selective visuospatial attention, more specifically, improves the subsequent searching of target due to ignoring of irrelevant information. The above results provide empirical evidence for the effect of the top-down processing of emotion on attention network and theoretical approaches on negative emotions.

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