

# Sad emotion produces differential attention to emotion congruence targets

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## Abstract

The Rapid Serial Visual Presentation (RSVP) task is uniquely suited to studying the association between emotion and attention. We conducted an RSVP experiment in which the emotion of the participant (sad and neutral) and the emotional valence of the targets (sad, neutral and happy) were varied to test an emotion-congruence hypothesis. We found a significant emotion by target interaction in which the sad targets were identified better in the sad condition than in the neutral condition. The neutral and happy targets were identified equally well regardless of emotion condition. This indicates that experiencing a sad emotion influences changes in attention to sad words but not in attention to happy or neutral words.

## Introduction

The Rapid Serial Visual Presentation (RSVP) task presents stimuli in quick succession while the participant looks for targets. This task is uniquely suited to studying the influence of emotion on attention, as emotions and other events in our daily lives typically unfold across time. An RSVP study manipulating the emotions of the participant and the valence of the targets found that anxious participants processed emotion congruent stimuli more efficiently than neutral stimuli (Lystad, Rokke, & Stout, 2009). In another study, dysphoric individuals processed negative stimuli less efficiently than neutral stimuli (Koster, De Raedt, Verschuere, Tibboel, & De Jong, 2009). In both of these studies, the emotional target was the first target to be attended. The influence of attending to emotional information was measured by the impact that attention had on the identification of a subsequent target.

Given the acknowledged relationship between emotion and cognition (Bower, 1981) we would expect the valence of the target and the emotion of the participant to interact in an emotion congruent manner. Therefore, we conducted an RSVP experiment in which the emotion of the participant (sad and neutral) and the emotional valence of the second target (T2; sad, neutral and happy) were varied. Previous research has found that emotional T2s are identified more accurately than neutral targets (Anderson & Phelps, 2001). However not many studies have examined the interaction between the emotion of the participant and detection of an emotional T2. Therefore, to study the influence of emotions on attention to emotional T2s, the emotional target was moved to T2 in our study. We hypothesized that sad emotion would be associated with better detection of the sad target than the neutral emotion and neutral and happy targets.

**References:**  
Anderson, A. K., & Phelps, E. A. (2001). Lesions of the human amygdala impair enhanced perception of emotionally salient events. *Nature*, 411, 305–309.  
Bradley, M. M., & Lang, P. J. (1999). Fearfulness and affective evaluations of pictures. *Motivation & Emotion*, 23(1), 1–13.  
Bower, G. H. (1981). Mood and memory. *American Psychologist*, 36(2), 129–148.  
Koster, E. H. W., De Raedt, R., Verschuere, B., Tibboel, H., & De Jong, P. J. (2009). Negative information enhances the attentional blink in dysphoria. *Depression & Anxiety (1091-4269)*, 26(1), E16–E22.  
Lystad, C. M., Rokke, P. D., & Stout, D. M. (2009). Emotion congruent facilitation of attention when processing anxious stimuli. *Cognitive Therapy and Research*, 33(5), 499–510. doi:10.1007/s10608-008-9210-1  
This experiment has now been published as part of a manuscript along with several other experiments - Rokke, P. D., & Lystad, C. M. (2014). Mood-specific effects in the allocation of attention across time. *Cognition & emotion*, (2014), doi: 10.1080/02699931.2014.893865

## Method

Nineteen undergraduates (15 men) at NDSU participated in exchange for class credit. A within subjects design of 2 (emotion; sad and neutral) x 2 (task; single and dual) x 3 (emotional valence of target; sad, neutral, and happy) x 3 (T2 position) was used. The RSVP trials presented words at 100ms each with no ISI. A neutral T1 was presented in red and either a sad, neutral, or happy T2 was presented in green at 200, 300, or 700 ms following T1. All distractors were neutral and in black. The participants were asked to ignore T1 and identify T2 in the single task conditions and identify both T1 and T2 in the dual task conditions. Emotion was induced in participants by showing a picture from the IAPS (Bradley & Lang, 1999) at the beginning of each RSVP stream while playing emotionally relevant music throughout the experiment. Both pictures and target words were selected for their varying mean ratings of pleasure. Only one emotion was represented in each block. The participants completed all four conditions in one session.



Figure 1: Examples of pictures used to induce relevant emotions.

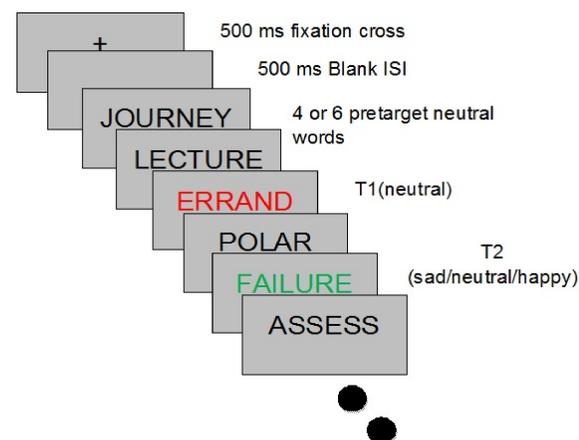


Figure 2: Schematic of one RSVP trial succeeding the picture displayed to induce emotion.

## Results

The primary dependent measure was percent correct identification of T2 following the accurate identification of T1. ANOVA yielded a main effect for task,  $F(1,18)=42.609$ ,  $P<0.01$ , position  $F(2,36)=38.822$ ,  $P<0.01$ , emotion by target interaction  $F(2,36)=3.222$ ,  $p=0.027$  and a task by position interaction  $F(2,36)=19.077$ ,  $p<0.01$ . A paired samples t test indicated a significant difference between emotion by target  $t(18)=2.268$ ,  $p=0.036$ , in which sad stimuli were identified better when experiencing a sad emotion than a neutral emotion (Figure 3). None of the other comparisons were significant.

The three way interaction of task by target by position interaction was also significant  $F(4,72)=3.579$ ,  $p=0.01$ . An ANOVA indicated a significant target by position interaction,  $F(4,72)=3.718$ ,  $p=0.008$  in which the sad targets were identified less often during the first 200 ms than the neutral targets (Figure 4).

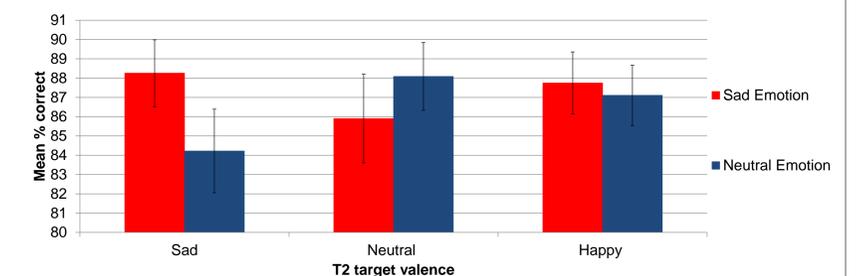


Figure 3. Mean performance across sad and neutral conditions with sad, neutral and happy T2s.

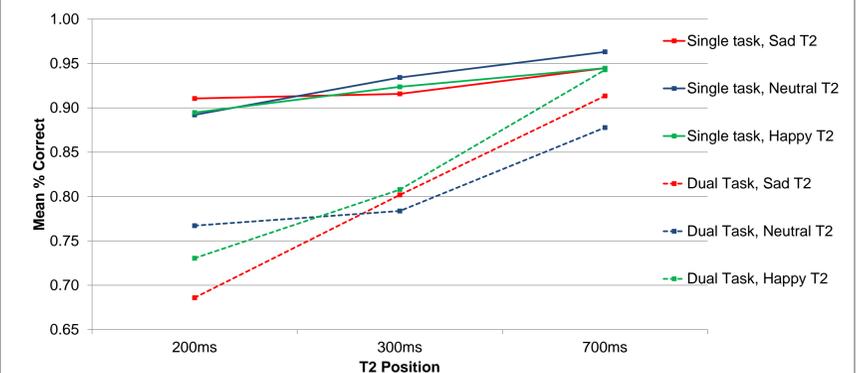


Figure 4. Task by target by position interaction.

## Conclusion

•When experiencing a sad emotion, detection of sad stimuli increases to the level of detection of other neutral and happy stimuli. This is not observed under normal neutral conditions.

• This supports the emotion-congruence influence consistent with Bower's network theory.