Interactions of Attention and Emotion in Language Processing

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function of attention in cognition

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Introduction

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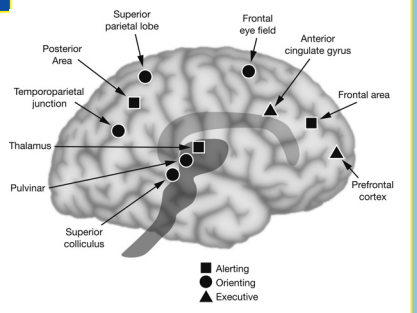

Networks for alerting, orienting and executive attention (Posner et al., in press).

Emotional stimuli may attract more attention than neutral stimuli. Some hints for this have been found in different experimental paradigms such as attentional blink, emotional stroop or with steady state visual evoked potentials (Ihsen et al. 2004; Keil et al. 2005, Williams et al. 1996).

We are interested in the processing of emotional words. Do emotional words attract more attention than neutral words? Which attentional networks does emotion interact with? Are the effects the same in different modalities?

Posner & Petersen (1990) proposed three attention networks:

- alerting (achieving and maintaining an alert state)
- orienting (selection of information from sensory input)
- executive attention (resolving conflict among responses)

The sources of alerting, orienting and executive attention have been investigated with fMRI and in neurological patients, see Figure 1. The three networks can be tested in the later developed Attention Network Test (ANT, see Figure 2, Fan et al. 2002).

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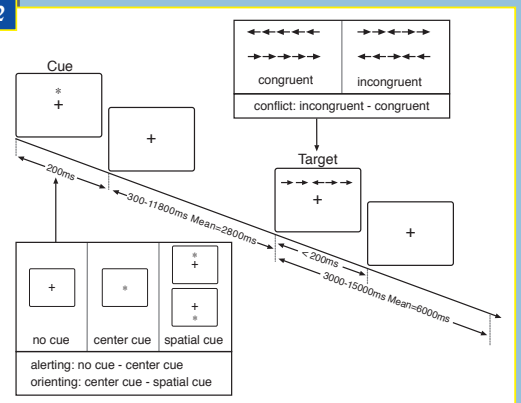

Attention Network Test (ANT) as used in an fMRI study by Fan et al. (2005).

Experiment 1

The ANT can be adopted to probe the interactions of attention and emotion. A possible design to test for interactions of emotion with alerting and orienting is outlined in Figure 3. Two possible designs to examine executive attention and emotion are shown in Figures 4 and 5. The critical stimuli are one and two syllable nouns rated for emotional valence, arousal and concreteness and controlled for frequency.

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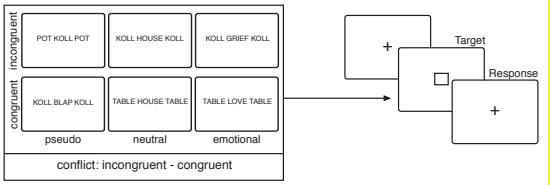

Lexical decision flanker task. Emotional and neutral words are either flanked by words or pseudowords, thus creating a congruent and an incongruent condition to examine the interaction of emotion and executive attention.

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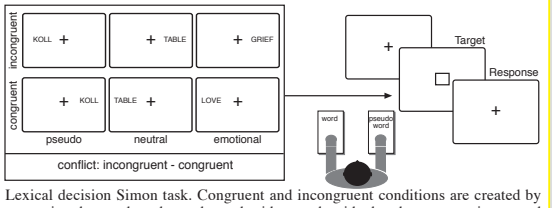

Lexical decision Simon task. Congruent and incongruent conditions are created by presenting the words and pseudowords either on the side that the response is mapped to or on the opposite side.

Hypotheses

Emotional cues might increase alertness more than neutral ones, lead to a faster orienting to the cued location and increased reorienting costs away from an invalidly cued position. This might be reflected in altered activation in the alerting and orienting networks. Activity in the anterior cingulate which is part of the executive attention networks is also often found in emotional tasks, thus there might also be an interaction between emotion and executive attention.

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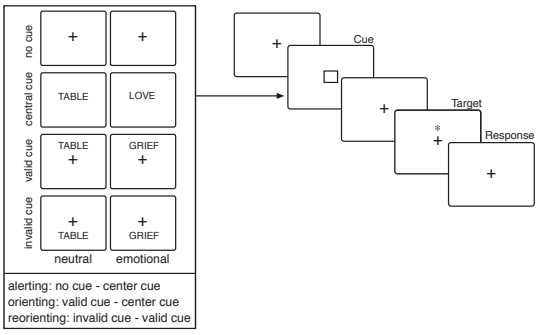

Target detection task in which emotional and neutral words serve as cues to examine the interaction of emotion with alerting and orienting.

Experiment 2

Additionally to the information contained in a written word, speech can transport emotion also via prosodic variation. It would therefore be interesting to also investigate the interaction of speech signals with attention. Figure 6 shows a possible design for an auditory ANT version with simple tones. In a next step syllables, words and pseudowords with varying emotional semantics and prosody could be used instead of the simple tones.

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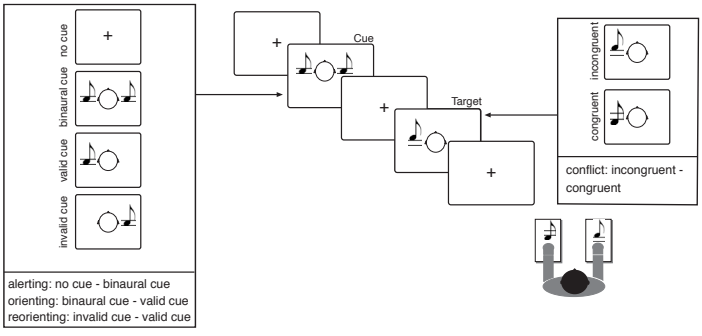

Pitch discrimination Simon task. Cue tones, which differ in frequency from the target tones, are presented binaurally or monaurally, validly or invalidly predicting the presentation side of the target. Congruent and incongruent conditions are created by presenting the high and low tones either on the side that the response is mapped to or on the opposite side.

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