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Positive emotion expands visual attention... Or maybe not...

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A considerable amount of research has investigated the effect of emotion on visual attention. One prominent model in the field is the broaden-and-build theory, which suggests positive emotions broaden the scope of attention. In addition, the theory proposes positive emotions increase the amount of resources available to a person, which can thus accumulate to enhance life skills and well being. However, while there is evidence to support this theory, other research has critiqued certain aspects of the model. Some studies propose that the methods used to investigate the broaden-and-build theory do not accurately measure the broadening of attention, while others highlight that a broadening of attentional resources is not always advantageous. Moreover, evidence has shown that different types of positive and negative emotions impact differently on the scope of attention. This paper will discuss the different aspects of research in the area, and explore the influence of emotion on the spread of visual attention.

The broaden-and-build theory

In recent years, the effect of emotion on cognition has become a popular area of study. One significant model in the field is the broaden-and-build theory, which proposes positive emotions (such as joy, interest, contentment, pride, and love) broaden a person's "thought-action repertoires" and expand the scope of attention (Frederickson, 1998; Frederickson, 2001). Furthermore, Frederickson (1998) suggests a broadening of attention can increase the amount of physical, intellectual, and social resources available to a person. For example, when an individual experiences interest, they expand their world-view, are more open to new experiences, and can build on their social resources. It is suggested that such resources can accumulate to enhance one's life skills, meaning positive emotions have a beneficial impact on long-term wellbeing. In addition, while the broaden-and-build theory focuses primarily on positive emotions, it also proposes that negative moods (such as anxiety, sadness, anger, and despair) have a narrowing effect on attention, therefore limiting the amount of resources available to a person (Frederickson, 2001).

Previous work has found evidence for the broaden-and-build theory using a variety of methods (e.g., Basso, Schefft, Ris & Dember, 1996; Derryberry & Tucker, 1994). One commonly used approach is the global-local processing task, which measures the allocation of attention globally (to a whole stimulus) or locally (to a specific section of a stimulus). For instance, participants are presented with a large letter N (the global feature) composed of several, smaller images of the letter L (the local feature) and are asked to select the letter they first observe. Responding to the global feature represents a broader scope of attention, while a focus towards the local feature shows a narrowing of attentional resources (Navon, 1977). In one study, Fredrickson and Branigan (2005) used a variation of the global-local processing task to test the broaden-and-build theory. Participants were shown an original letter from Navon's (1977) task that was presented alongside two further letters, one similar to the global feature of the original letter and one the local. They were presented with positive, negative, or neutral video clips to induce emotion before completing the task. The study found that when induced into a positive mood, participants were more likely to respond to the global feature than the local one. It was argued that these findings show that positive emotions broaden the scope of attention and expand the amount of resources available to a person, supporting the broaden-and-build theory.

Other methods for exploring the effect of emotion on attention

Yet, other work has questioned whether the global-local processing task is an appropriate method to measure the spread of attention. Bendall and Thompson (2015) suggest that while the task measures global or local precedence, it does not require spatial shifts of attention to different aspects of a stimulus. Consequently, it could be argued that the task actually measures preferred processing style, and not the broadening or narrowing of attentional resources. Moreover, the broaden-and-build theory predicts that positive emotions lead to an expansion of resources, allowing a wider range of information to be processed. However, generally individuals show a global precedence effect and global processing is more commonly used than local processing (e.g., Fiske & Taylor, 1991; Navon, 1977). As such, it may be proposed that more resources are required to identify local rather than global stimuli, because objects in the wider field of vision must be inhibited. On the basis of this, global precedence in a global-local processing task does not logically suggest a broadening of attention. Such criticisms have prompted researchers to use different methods to test the broaden-and-build theory.

In one study, Bendall and Thompson (2015) used the change detection flicker task to measure the spread of attention. In this task, participants are presented with an image that is followed by the same image with a slight alteration. The images are separated by a blank screen making the change difficult to detect; a phenomenon known as ‘change blindness’ (Rensink, O’Regan & Clark, 1997). In this study, changes were made to either the centre or periphery of each image. The authors suggested that as participants must attend to different areas of each scene, this task more accurately measures the broadening or narrowing of attention. Participants were induced into positive, negative, and neutral mood states and were asked to detect the changes as fast as possible. If central changes were detected faster than peripheral changes it would indicate a narrow scope of attention, whereas faster detection of peripheral changes would demonstrate a broader spread of attention.

The results showed that although central changes were spotted faster than peripheral changes (a robust finding a change detection task), emotion had no impact on the scope of attention. These findings suggest emotion does not broaden or narrow visual attention, and they do not support the broaden-and-build theory. Rather, the authors propose that previous studies using the global-local processing task simply illustrate that global processing is the preferred processing style when in a positive mood, and they do not prove a broadening of attentional resources.

However, in contrast to these findings, other studies have provided evidence for the broaden-and-build theory using alternative methods (i.e. not a global-local task). Wadlinger and Isaacowitz (2006) conducted an eye-tracking study in which participants were presented with central and peripheral images and induced half of them into a positive mood prior to viewing. The results showed that participants in a positive mood spent more time viewing the peripheral stimuli than those in the neutral condition, suggesting a broadening of attention due to positive affect.

Bruyneel et al. (2013) also tested the broaden-and-build theory using an alternative method. Participants completed a variation of the flanker task in which they were asked to focus on a central stimulus while presented with surrounding distractors (Eriksen & Eriksen, 1974). The distractors were placed at three distances from the central target (near, medium, and far) and participants were induced into positive or neutral mood before completing the task. The authors proposed that this was a suitable method for measuring the spread of attention as it had been successfully used in previous studies (Rowe, Hirsh, & Anderson, 2007). Yet across three experiments, they found no interaction between emotion and the spread of attention, again contradicting the broaden-and-build theory. It is clear that research

in this area is becoming increasingly varied and the broadening effect of positive mood is not always replicated when using other methods. This highlights the need for careful consideration in future research when deciding on a method to accurately measure the spread of attention.

Evidence that positivity narrows and negativity broadens

Research investigating the effect of emotion on attention has often made a clear-cut distinction between positive and negative mood. For example, the broaden-and-build theory suggests positive emotions (such as joy, interest, contentment, pride, and love) broaden the scope of attention while negative emotions (such as anxiety, sadness, anger, and despair) narrow attention. However, different types of positive and negative mood can induce different reactions. For example, emotions have different levels of motivational intensity (the motivation to move towards a positive situation and away from a negative one; Gable & Harmon-Jones, 2010). With regard to negative emotions, sadness may have low motivational intensity as it does not induce an action, whereas anxiety has high motivational intensity as it evokes a response to a situation. As such, research has questioned whether emotions of the same type but different motivational intensity have the same impact on visual attention. In one study, Gable and Harmon-Jones (2010) induced participants into negative emotions of differing motivational intensity (sadness being low and disgust being high) using images from the IAPS (International Affective Picture System; Lang & Bradley, 1997). After viewing each set of images, participants completed a global-local processing task to assess the scope of attention. The findings showed that when induced into a negative mood using sad images participants responded faster to the global stimuli than the local stimuli (compared to a neutral condition). In contrast, when induced into a negative mood using disgusting images reaction times were faster for the local targets. These results suggest that negative emotions with low motivational intensity broaden the scope of attention whereas those with higher motivational intensity narrow the scope of attention. This contrasts with past research that generalises a narrowing effect on attention of all negative emotions.

Gable and Harmon-Jones (2008) also found that positive emotions of high motivational intensity can narrow visual attention, which provides further conflicting evidence for the hypothesis that positive mood broadens attention and builds resources. They induced participants into positive emotions of low motivational intensity (watching comical videos of cats) or high motivational intensity (watching a video of delicious desserts) and used Kimchi and Palmer's (1982) global-local visual processing task to measure the spread of

attention. Participants induced into high motivational intensity states showed less global focus in the task, demonstrating a narrowing of attention. The authors suggested that this is because motivation to move towards high intensity situations requires focused attention and, consequently, a narrowing of resources.

Within this area of research there is now evidence to suggest that not all negative and positive emotions have the same effect on the spread of attention. It is worth noting that most studies supporting the broaden-and-build theory have investigated positive emotions of low motivational intensity (contentment) and negative emotions of high motivational intensity (anxiety) (Gable & Harmon-Jones, 2010). This could account for the broadening of attention in a positive mood proposed by Fredrickson (1998; 2001), and testing across a wider range of emotions is necessary to further investigate the theory. In addition, motivation is not the only aspect affecting different emotions. For example, arousal, while reported as having a similar effect on attention as motivation intensity, is not identical to motivation (Gable & Harmon-Jones, 2008). Thus, research measuring other characteristics of emotion is crucial in order to assess the full impact of different moods on visual attention.

The potential positive impact of negative affect

The broaden-and-build theory states that positive emotions provide more resources which can accumulate to improve physical, intellectual, social, and psychological life skills (Fredrickson, 1998; Frederickson, 2001). The theory additionally implies that negative emotions have the opposite effect, causing a narrowing of attention that limits the acquisition of new resources. Despite this, it should be noted that attentional broadening (potentially due to positive affect) is not beneficial in all circumstances. For example, Rowe, Hirsh, and Anderson (2007) found that positive mood broadened attention but distracted from the task at hand. In their study participants completed a version of the flanker task (Eriksen & Eriksen, 1974) and were presented with distractors surrounding a central target. The results showed that those in a positive mood were more susceptible to distractions than those in a neutral condition. Although this demonstrates that the spread of attention was broadened by positive emotions, it also shows that participants performed worse on the task and so 'broadening' was not beneficial.

It is therefore important to acknowledge that positive emotions may not always enhance resources and improve performance as predicted by the broaden-and-build theory. Some situations require a narrower focus of attention in order to complete a task efficiently and successfully. Other researchers have also proposed that the building of social and

psychological resources are too complex to be credited solely to the experience of positive emotions, and highlight that more research is needed to fully understand the beneficial role of negative emotions in this area (Rathunde, 2000). Given these arguments it is perhaps time to create a mixed model that considers the role of both positive and negative emotions in the accumulation of resources.

Conclusion

Overall, the findings regarding emotion and visual attention have shown conflicting results. Whilst there is strong empirical evidence to support the broaden-and-build theory (Fredrickson & Branigan, 2005; Wadlinger & Isaacowitz, 2006), several studies have found no impact of emotion on attention (Bendall & Thompson, 2015; Bruyneel et al., 2013). One difference in the studies discussed in this paper is the method used to measure the scope of attention, and it is vital that future research considers precisely what the chosen procedure is measuring. Furthermore, research investigating motivational intensity has shown that the complexity involved in different types of emotion has an influence on the spread of attention (Gable & Harmon-Jones, 2008; 2010). As such, a clear outline of the emotions to be investigated would also benefit future research in the area. Finally, despite clear evidence to show that positive emotion can have a beneficial impact to an individual's cognitive resources, it is important to consider both the positive and negative effects of emotion going forward, to create a more balanced model in the field. Such considerations might be useful for future research in the area of emotion and visual attention.

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