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Adult attachment and motivated attention to social images: Attachment-based differences in event-related brain potentials to emotional images

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ABSTRACT

Differences in adult attachment may concord with differences in social perception. The present study aimed to measure neural activity associated with the presentation of visual social stimuli. In an affective oddball paradigm, event-related brain potentials were recorded while participants viewed negative, positive, and neutral images of people and categorized them according to valence. Brain response amplitudes were examined across valence categories and across attachment groups. Results revealed differences between anxious and avoidant groups in "emotion bias". The avoidant group displayed a bias towards more neural activation in response to negative compared to positive images. The anxious group trended in the opposite direction. Results are discussed in terms of possible attachment-based differences in motivated attention to social stimuli.

1. Introduction

Perception is not reality. However, perceptions help to shape one's own reality, in part by guiding behavior. For example, if others are habitually perceived as being hostile, then one is likely to shrink from them and live in relative isolation. By contrast, if others are habitually perceived as warm and inviting, one is likely to engage with them. Adult attachment theory provides a conceptual framework to aid in understanding these perceptual and behavioral differences. Attachment theorists have predicted that an individual's attachment style affects the way in which incoming interpersonal information is automatically processed and encoded (e.g. Shaver & Mikulincer, 2003); interpersonal perceptions are an integral aspect of attachment behavior (Shaver & Mikulincer, 2002). Furthermore, the domain of interpersonal perceptions which are attachment-relevant may include more than just perceptions of close relationship partners. Shaver and Mikulincer (2003) posited that individual differences in attachment-system functioning that began with singular relationships in childhood can form the foundation upon which later, more global social appraisals are built. The authors posit that insecure attachment styles are associated with biased automatic encoding of incoming information. This results in social appraisals that are biased towards conforming with expectations that are congruent with one's attachment style (Dykas & Cassidy, 2011; Shaver & Mikulincer, 2003). Brumbaugh and Fraley (2007) found indirect support for that notion in the relative consistency of attachment patterns transferred onto novel others that resembled attachment partners. Since the novel others were mere hypothetical constructs, it is interesting to note that attachment feelings were immediately transferred onto them. It is therefore important to consider what immediate effects attachment styles might have on the neurological processing of novel others. Neurological processing is of course immensely complex, but insight can be gained by narrowing the investigation to comparing two basic motivational categories: positive and negative.

The two categories of positive and negative are basic and vital in motivated behavior (see e.g. Norris, Gollan, Berntson, & Cacioppo, 2010, for an overview). Most often, one is likely to approach what is perceived as positive and withdraw from what is perceived as negative. Such phenomena can be extended to include approach and withdrawal behaviors in the social domain (see e.g. Gable & Berkman, 2008). It is important to note that situations and people are rarely objectively positive or negative. The answer to why some people approach and others avoid may lie in the strength of subjective perceptual processing of positive versus negative motivational cues. In this vein, an exploration of the role of the *negativity bias* in attachment behavior may be important. The negativity bias refers to the general tendency for negative information to outweigh positive information. According to Rozin and Royzman (2001), "the principle, which we call negativity bias, is that in most situations, negative events are more salient, potent, dominant in combinations, and generally efficacious than positive events" (p. 297).

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Evidence for the general accuracy of this principle comes from a variety of domains as diverse as impression formation (Peeters, 1971), politics (Jordan, 1965), risk-taking (Kahneman & Tyversky, 1979), emotional reactivity (Taylor, 1991), person perception (Rothbart & Park, 1986), and attentional capture (Pratto & John, 1991), to name a few (for reviews see Baumeister, Bratlavsky, Finkenauer, & Vohs, 2001; Rozin & Royzman, 2001).

Despite this overall trend for a negative bias, different populations have been shown to vary in the extent and even the direction of bias displayed. For example, researchers have discovered an attenuation or reversal of the negativity bias in older adults (e.g. Carstensen, Pasupathi, Mayr, & Nesselroade, 2000; Wood & Kisley, 2006). In contrast, an increase in the negativity bias has been noted in other groups such as those with clinical depression and anxiety. For example, negative attributional styles (Abramson, Metalsky, & Alloy, 1989), and negative schemas (Beck, 1987) which give greater weight to negative aspects of one's self and environment have both been associated with depression. Affective anxiety has been consistently associated with greater attentional biases towards threat-related information (for a meta-analysis see Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & van IJzendoorn, 2007). Additionally, excessively negative interpretive biases have been noted in a range of anxiety disorders such as social anxiety (Amir & Foa, 2001), PTSD (Foa, Steketee, & Rothbaum, 1989), and panic disorder (Clark & Beck, 2010). It is important to note that these group-based differences in the negativity bias are not simply curious artifacts. In each of the aforementioned groups, the biases are thought to be generative factors in behavior. For example, the increased negative biases in anxiety and depressive disorders are thought to be active ingredients in the generation and maintenance of symptoms (e.g. Beck, 1987; Clark & Beck, 2010). These biases, as in social anxiety (Amir & Foa, 2001) can facilitate the avoidance of other people. From this perspective, examination of the relationship between the negativity bias and attachment behavior, especially attachment avoidance, may be useful.

An interpersonal negativity bias should be facilitative of general interpersonal distancing. Accordingly, avoidant attachment has been linked with more negative views of relationship partners (e.g. Collins, 1996; Feeney & Noller, 1991), a more negative view of others (Bartholomew & Horowitz, 1991), and negative views of human nature (Collins & Read, 1990). In contrast to avoidance-related biases, it might be logical to infer the existence of a social positivity bias in attachment anxiety because of their desire for proximity maintenance. Indeed, anxious attachment has been conceptualized as involving a positive view of others (Bartholomew & Horowitz, 1991). However, that idea does not seem consistent with the accumulated evidence. Mikulincer and Shaver (2007) offer instead a nuanced view of attachment anxiety, proposing that it is associated with complex views of others which involve hopes for proximity attainment, yet doubts about a partner's ability to consistently provide it. Development for these individuals is associated with frustration at the hands of close others, yet also with enough gratification so that bids for proximity are intensified (Cassidy & Berlin, 1994). Therefore, a somewhat negative view of others is adopted because important others have not provided optimal security (Mikulincer & Shaver, 2007). However, a totally negative view is not adopted because that would imply proximity seeking is hopeless. There is experimental evidence that supports these assessments.

For example, using the Implicit Association Test, DeWitte and De Houwer (2008a) found avoidance to be related to interpersonal distancing themes. Two experiments were conducted; one contrasted goal-related words (I *want*; *I don't want*) with proximity and distance-related words. In the second experiment, the researchers replaced the goal-related words with valenced words (*positive*; *negative*). Attachment avoidance was related to the desire for distancing in the first experiment and the positivity of distancing in the second. Thus, avoidance was related to apparently greater neural accessibility to distancing information as connected to valence and goals. In contrast, attachment anxiety was found to be related to proximity goals, but only on explicit paper and pencil tasks. Such mixed results regarding anxiety and proximity goals have also been encountered elsewhere (e.g. Mikulincer, Shaver, Bar-On, & Ein-Dor, 2010), and may reflect the ambivalence associated with anxiety as described above (Mikulincer et al., 2010; Simpson, Rholes, & Nelligan, 1992).

Zhang and Hazan (2002) also provided some support for the notion of attachment-based differences in the negativity bias. Their experimental design was similar to the one used by Rothbart and Park (1986) which revealed a negativity bias in social judgments in a general sample. Rothbart and Park found that, overall, participants required more information to confirm others' positive traits than to confirm negative ones. The converse was true when asked to disconfirm traits: Participants required more information to disconfirm negative traits than to disconfirm positive ones. Thus, Rothbart and Park found a negativity bias both in confirmation and disconfirmation of others' traits. Zhang and Hazan applied the paradigm to adult attachment and found these judgments to vary with attachment dimensions. Although the authors did not discuss findings in terms of the negativity bias, their results indicated the following differences: High scores on the avoidance dimension were associated with a negativity bias that was similar to Rothbart and Parks' overall findings. However, unlike the avoidance dimension, the anxiety dimension did not display a negativity bias.

Studies that employ facial images may be important, both because of the general adaptive relevance of facial expressions (Darwin, 1872/1965) and because of the importance of facial expressions in the child-caregiver relationship (Trevarthen, 1985). In a series of experiments, Fraley, Niedenthal, Marks, Brumbaugh, and Vicary (2006) employed a morph-movie paradigm in which facial expressions slowly shifted into and out of emotional expressions. Participants were asked to judge the point at which expressions began and ended. Highly anxious participants judged both the onset and offset of emotion more quickly than their less anxious counterparts. In contrast, no significant results were found for avoidance. The results therefore indicate that attachment anxiety is associated with a perceptual vigilance to changes in emotional expression. No negative or positive biases were discovered: the hyper-vigilance was equally evident across valence categories. However, these experiments were designed to measure perceptual vigilance to changes in emotional expressions; not the relative motivational significance of each emotional category itself.

More direct investigations of attentional deployment may bring additional insight because of the link between motivation and attention (e.g. Lang, Bradley, & Cuthbert, 1990). Dewitte and De Houwer (2008b) performed such an investigation using an emotional variation of Posner's (1980) exogenous cueing task. Attentional biases were calculated as a function of reaction times on trials in which happy, angry, and neutral faces were presented as cues. Results revealed a main effect of attachment anxiety in which increases in anxiety were related to attention away from both angry and happy facial images. Interactions revealed that high scores on both anxiety and avoidance (fearful avoidance) best predicted these effects. However, Cooper, Rowe, Penton-Voak, and Ludwig (2009) failed to replicate these results. Additionally, their own results across three studies were so inconsistent that they questioned the validity of the emotional variation of Posner's paradigm. Therefore, investigations using other measures of attention may be more appropriate.

A promising method for further examination of attachment-related social information processing uses scalp-recorded event-related potentials; the late-positive potential (LPP) waveform component may be particularly useful. The LPP is sensitive to