

Face blindness research shows emotions are key in the study of face recognition

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Recognizing the faces of family and friends is usually an effortless process. However, a minority of people have difficulties identifying the person they are meeting or remembering people they have met before. These problems can be quite dramatic, to the point where those affected fail to recognize the face of their spouse or child or even their own face. New research on face blindness demonstrates the importance of using naturalistic emotional faces and bodies for a better understanding of developmental face disorders.

The study, which is published in the open-access journal *PLoS ONE* this week, by researchers in the Netherlands and at Massachusetts General Hospital, led by Beatrice de Gelder, shows that the presence of emotional information in the face increases neural activity in the area of the brain associated with face recognition (the fusiform face area, or FFA), a finding that could be used to design novel assessment and training programs. The study also provides evidence that body and face sensitive processes are less categorically segregated in people with face blindness and points to a possible cause of face blindness in cortical specialisation.

Recent research has shown that as much as 2% of the population suffers from face recognition difficulties. On analogy with developmental dyslexia, these cases are commonly referred to as developmental prosopagnosia, referring to the possible origin of the adult face recognition deficit in anomalous development of the full face recognition skills.

Faces provide many different types of information, such as gender, age, emotion, familiarity and attractiveness and these details can be called upon and used in different ways in daily life (sometimes the context only requires rapid detection that a face is present, other times, full recognition of all facial attributes, including name retrieval, is required). The contextual requirements and the task settings are thus very important for evaluating face recognition problems and for understanding its neuro-functional basis and possible deficits.

Using functional magnetic resonance imaging, de Gelder and colleagues compared the ability to process faces in a group of individuals reporting life-long problems in recognizing people and with particular difficulties when meeting familiar people unexpectedly—developmental prosopagnosics—with a control group matched for age, sex and education level.

The researchers sought to investigate how the neural underpinnings of face and body processing in prosopagnosia are influenced by emotional information in the face and the body and ran a series of tests on the participants, assessing abilities such as object and face recognition and perception, face matching and face memory.

De Gelder and colleagues found that compared to the control group, the developmental prosopagnosia group displayed a similar activation level in FFA for the emotional faces, but a lower activation in this area for neutral faces; these findings are consistent with the view that there is a higher threshold for the recognition of neutral faces in prosopagnosics. This relative difficulty with neutral faces is based on the idea that faces are more difficult stimuli than many of the other categories with which they are routinely compared.

The scientists explain that emotional stimuli trigger a higher level of arousal and emotion in a face constitutes an additional feature that

carries important communicative information, making it more salient. Consistent with this, they observed a higher activity level of activity in the amygdala (the region of the brain associated with emotional reactions) for emotional faces compared to neutral ones.

Since face processing is likely to involve a variety of hierarchical and parallel processes, impairments in different processes will result in different types of behavioral and neuro-anatomical correlates. The results of this study demonstrate the importance of emotional information in face processing and the researchers urge future imaging studies to take into account the modulatory effect of emotion, in order to further untangle the complex nature of developmental prosopagnosia.

Citation: Van den Stock J, van de Riet WAC, Righart R, de Gelder B (2008) Neural Correlates of Perceiving Emotional Faces and Bodies in Developmental Prosopagnosia: An Event-Related fMRI-Study. PLoS ONE 3(9): e3195. doi:10.1371/journal.pone.0003195
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