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Review

The neuroscience of in-group bias

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ABSTRACT

Racism and in-group favoritism is prevalent in our society and has been studied in Social Psychology for a long time. Recently it has become possible to investigate the neural mechanisms that underlie these in-group biases, and hence this review will give an overview of recent developments on the topic. Rather than relying on a single brain region or network, it seems that subtle changes in neural activation across the brain, depending on the modalities involved, underlie how we divide the world into 'us' versus 'them'. These insights have important implications for our understanding of how in-group biases develop and could potentially lead to new insights on how to reduce them.

Contents

1. Introduction

Through evolution, the human brain has developed to adjust to complex social group living (Dunbar, 2011). Neuroimaging studies have shown that our neural correlates respond differently to in-group and out-group members (Eberhardt, 2005; Amodio, 2008; Ito and Bartholow, 2009; Chiao and Mathur, 2010; Kubota et al., 2012; Eres and Molenberghs, 2013). Understanding how these neural correlates are influenced by group membership is important for a better understanding of how complex social problems such as racism and in-group bias develop. Race is just one of many dimensions that people can use to categorize themselves. Gender, age, profession, ethnicity, status, country of birth, sports team, social group and education are just a few examples that we use to categorize people as belonging either to the in-group or out-group. Research has shown that people categorize themselves and others even based on trivial criteria (Tajfel et al., 1971) and this categorization can be very fluid and is often context dependent (Turner et al., 1994). This review gives an overview of recent neuroimaging studies that have investigated in-group bias. Rather than proposing a static view of in-group bias associated with a specific brain area, the neuroimaging results presented in this review suggest that a wide range of neural correlates involved in social categorization, action perception, empathy and face perception can all be modulated by group membership and that these modulations are influenced by context (Fig. 1). This suggests that not only neural correlates involved in conceptual representation but also perception and emotion influence how we see in-group and out-group members. These group modulations can therefore be the result of either implicit bottom-up processes or conscious

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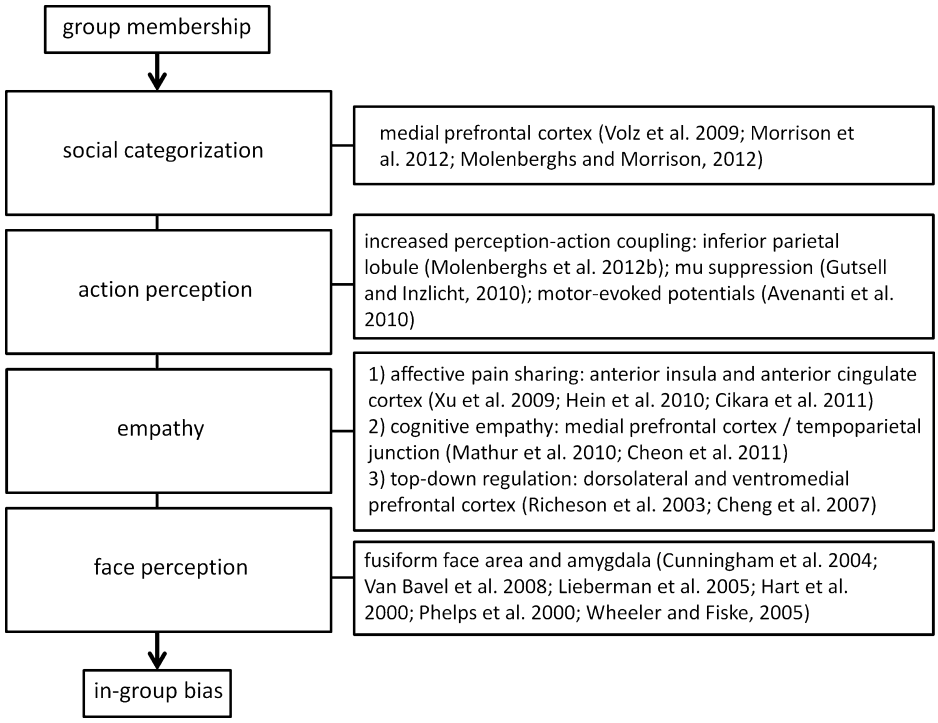

Fig. 1. A schematic overview of how group membership can modulate the neural correlates involved in social categorization, action perception, empathy and face perception and how this can lead to in-group bias. On the right is a brief overview of the critical brain areas per modality and the studies that found group membership modulation. The respective studies are described in more detail in the manuscript.

top-down regulation. Re-categorization or experience can change how these neural correlates are influenced by group membership due to the plastic nature of the brain. Such findings have important implications for a deeper understanding of how in-group bias occurs and this knowledge will hopefully lead toward new strategies to reduce in-group bias in the future.

2. We categorize in-groups differently

Research into social categorization, prejudice and inter-group conflict has a rich history in social psychology starting more than 50 years ago (Allport, 1954; Brown, 1988; Devine, 1989; Duckitt, 1992; Brewer, 2002; Brown, 2011). For example, Sherif et al. (1961) in their famous 1954 Robbers Cave experiment studied group conflict by inviting 22 fifth grader boys unbeknown to each other on a summer camp in Robber Cave State Park, Oklahoma. In the initial stage, they split the boys into two groups, without them knowing the existence of the other group, to establish solid in-group formation. Soon the two groups established themselves and they named themselves Rattlers and Eagles. After the initial stage, the two groups were brought into contact with each other in competitive situations such as baseball and tug-of-war games where they could win prizes to create inter-group conflict between the two groups. Conflicts between the two groups started with name-calling and singing derogatory songs about the out-group but soon escalated into physical violence between the two groups (Sherif et al., 1961). In the final stage, the experimenters tried to reduce the friction between the two groups by bringing them together in non-competitive situations. However, mere contact between the two groups did not create less friction. For example, an idea to have the Rattlers and Eagles share a meal together ended in a food fight between the two groups. It was found that only when both groups collaborated together on projects with a superordinate goal (e.g., both groups joined together to fix the water supply to the camp) did friction between the two groups diminish.

Such elaborate setups, although high in ecological validity, are not easy to replicate in a laboratory situation, let alone inside an MRI scanner or while wearing an EEG cap. In a more controlled situation, Tajfel et al. (1971) set out to find the minimal situation for which people show in-group bias. For this, they randomly divided participants into two groups and let them divide monetary rewards between in-group and out-group members. Crucially, participants never met any of their group members, group membership was arbitrarily chosen and choices resulted in no direct benefit to the participant. Nonetheless, even under these minimal conditions, they found that participants rewarded more money to in-group members than out-group members. The results showed that participants chose options in which the in-group systematically received more money than the out-group rather than situations where both groups would receive more money but the in-group would receive less money than the out-group (Tajfel et al., 1971). It appeared that having more than the out-group was more important than maximum joint profit. This experiment is a little bit easier to replicate inside an MRI scanner and this is exactly what Volz et al. (2009) did. They randomly divided participants into a blue or yellow team member based on a trivial performance criterion. Participants then had to distribute money to unknown in-group and out-group members while their brain activity was measured using functional Magnetic Resonance Imaging (fMRI). The results showed more activation in dorsal medial prefrontal cortex, posterior anterior cingulate cortex, tempoparietal junction and precuneus when participants were engaged in social categorization (i.e., trials where they had to divide money between in-group versus out-group members compared to trials where they had to divide money between two in-group members or two out-group members) and when participants showed in-group favoritism (i.e., trials where they gave more money to in-group members than out-group members compared to fair trials). The authors concluded that the increase in medial prefrontal cortex activation for social categorization and in-group favoritism was related to increased activation