A Social Neuroscience Approach to Intergroup Perception and Evaluation

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Glossary

Social categorization – The process of classifying individuals into different social groups, or thinking about individuals primarily in terms of their social group membership(s).
Electroencephalography (EEG) – The measurement of electrical brain activity from several electrodes placed on the scalp. EEG provides a continuous measurement of brain activity on a millisecond time scale – a high temporal resolution relative to other techniques. Researchers often use EEG to measure electrophysiological responses to an internal or external stimulus, called event-related potentials (ERPs).
Evaluation – A current attitude toward an individual or group. It may be a function of prior experiences and stereotypes, and may range in intensity and the extent to which it includes positivity and/or negativity. In intergroup relations, evaluative preferences for one group over another group are often referred to as prejudice, especially when an in-group is preferred to an out-group.
Functional magnetic resonance imaging (fMRI) – The measurement of hemodynamic responses related to neural activity in the brain. FMRI provides a statistical map of brain activity associated with an internal or external stimulus, and does so on a scale of millimeters – a high spatial resolution relative to other imaging techniques.
Motivation – Includes the goals and desires of individuals during intergroup perception and interaction. Motivations to respond without prejudice have been the topic of recent investigation, although people may be motivated by a variety of goals. Individuals may be internally motivated by their personal values and standards, or externally motivated by social norms and context. Motivations can affect any stage of intergroup perception or evaluation.
Stereotype – Stereotypes are characteristics or traits attributed to a group of people. They may be true or false and can be positive or negative.

Introduction

Group formation and affiliation are pervasive aspects of human social life. Groups confer numerous advantages to individual members, including access to resources, cooperation, and a sense of belonging. There is a large literature illustrating the capacity of individuals to form and identify with groups, to use preexisting experiences and stereotypes to rapidly categorize and evaluate members of other groups, and to modify these processes in light of contextual goals and motivations. These are just some of the strategies humans employ to successfully navigate complex intergroup environments and thereby accrue the benefits of group membership.

Social neuroscience holds the promise of understanding human sociality by investigating the affective and cognitive operations of the human brain. By exploring the links between brain and behavior, social neuroscience can help decompose complex social phenomenon like intergroup relations into component processes, understand the operating characteristics of these components, and explore how these components work in concert to solve the complex task of successful social navigation. This relatively new multi-level approach has already provided important insights into the specific component processes that underlie intergroup social categorization, evaluation and motivation,

and illuminated the time course of intergroup processing. This approach has shown that specific brain regions process group membership relatively automatically and without conscious awareness, and that these processes have important implications for evaluations and behavior. This article provides an overview of social neuroscience research on intergroup relations with special attention to conscious and unconscious processes.

Theoretical Perspectives

This article decomposes intergroup processing to highlight several key processes and link them to brain function. Intergroup processing is instigated by an externally or internally generated perception of a person or group. Stereotypes and prejudices related to salient social categories are automatically activated and may be used to categorize and/or evaluate individuals. Once activated, stereotypes and prejudices may combine with move idiosyncratic information about the person or group to provide an initial evaluation. This initial evaluation can occur within milliseconds of perception and provides a platform for ongoing processing and behavior.

These simple, initial evaluations promote adaptive action in most contexts. For the most part, avoiding negative groups and approaching positive groups are efficient and adaptive strategies. However, simple evaluations are sometimes insufficient for guiding behavior in relation to more complex stimuli. In addition, rapidly formed evaluations may be conflicted or may conflict with an individual's higher-order goals and beliefs. For example, many North Americans have negative associations toward racial minorities but they often suppress these associations in an effort to fulfill their egalitarian ideals. In either event, most individuals are motivated to engage in additional, more reflective processing in order to render an appropriate social categorization, evaluation, and/or behavior. Although these stages are described sequentially from perception to behavior, there is increasing evidence that the order of these stages can vary. For example, an individual's attitudes toward a specific group can alter how they categorize a person (e.g., a racially prejudiced individual is more likely to use race as opposed to gender when categorizing a Hispanic woman).

Connecting aspects of intergroup processing to networks of brain activity offers valuable information about the processing and computational operations that subserve social categorization, evaluation, and motivation. By understanding these operations, intergroup researchers can develop more precise theories and generate novel predictions. The human brain is composed of a network of connected regions and the components of these networks engage in different types of information processing. Importantly, multiple regions operate in concert to process information and guide human behavior. Recent research has used functional magnetic resonance imaging (fMRI) to investigate the specific brain areas involved in different stages of intergroup processing and electroencephalography (EEG) to explore their timing. Lesion studies of patients with localized brain damage have supplemented fMRI work and provided causal tests of brain function. In addition, measures of the peripheral nervous system (PNS), including facial electromyography (EMG) and skin conductance, have provided information about the bodily reactions associated with evaluative processing. By triangulating across methods, theorists have already gained important insights into intergroup processing. The remainder of this article will describe some of the core component processes that subserve intergroup processing, with particular attention to the time course and the conscious and unconscious aspects of these processes.

Social Categorization

A core aspect of social perception is thinking about people in terms of their social group memberships – this is called social categorization. Social categorization can occur reflexively within milliseconds of perception to disambiguate a complex social world. Perceiving an individual in terms of their social category membership allows perceivers to apply preexisting information and attitudes about that social category to the individual. By providing information about otherwise novel individuals, social categorization reduces uncertainty about the social world and helps perceivers anticipate

the characteristics of others and calibrate their own behavior. Although social categorization is necessary to make informed inferences about novel people, its reliance on cognitive shortcuts such as heuristics, stereotypes, and prejudices may lead to systematic inaccuracies in the processing of any given person. For example, categorizing someone as a fraternity member may, on average, provide useful predictive information about their interests and social behavior, but there is no guarantee that these predictions will apply to this particular member.

A long tradition in intergroup relations has documented the cognitive and affective implications of perceiving in-group versus out-group members. One of the most robust effects of group membership is called the same-race memory bias. The same-race memory bias is a phenomenon whereby individuals are more likely to remember the identity of members of their own racial group relative to the members of other racial groups. The same-race memory bias has been extended to variety of nonracial groups (including novel groups formed under minimal conditions), strongly suggesting that the phenomenon is driven by deeper encoding of individual in-group members, regardless of race. It appears that the fusiform gyrus, an area of the brain involved in facial and categorical processing, may play a key role in the same-race memory bias. When viewing racial in-group members, Black and White individuals have stronger activation in the fusiform face area, an area of the fusiform sensitive to faces that may be more generally engaged in expert, in-depth processing of categories of stimuli. Moreover, activation of the fusiform to racial in-group (>out-group) members is correlated with the degree of same-race memory bias (i.e., superior memory for in-group faces). This research suggests that lower-level perceptual processing may play a key role in explicit racial biases in memory.

To help understand more about unconscious intergroup processing, researchers have started to explore the timecourse of neural responses to social groups. A number of recent studies have used event-related potentials (ERPs) to examine the automatic and controlled components of intergroup social categorization and evaluation. Whereas very early ERP waves (*c.* 170 ms) distinguish facial from nonface stimuli, subsequent ERP waves respond differentially to in-group and out-group members. Indeed, several studies have shown that racial in-group members are associated with larger ERP waves and thus more processing approximately 250 ms following stimulus presentation. These data converge with research on the same-race memory bias, suggesting that social categorization occurs rapidly and may be mediated by perceptual processes, and perhaps activity in the fusiform gyrus. Indeed, the rapidity with which individuals differentiate in-group from out-group members raises the possibility that early social categorization processes may be occurring outside conscious awareness and control. These data are also consistent with the view that individuals often engage in more in-depth processing of in-group members.

Consistent with these in-group biases in the central nervous system, similar biases are evident in PNS responses. Although activity in the PNS is generally slower than the central nervous system, it can nevertheless provide important insights into aspects of intergroup processing, such as social categorization. Converging with fMRI and EEG studies, PNS activity is heightened while perceiving the emotional displays of in-group members. Specifically, Black and White individuals both show increased skin conductance and facial EMG responses to pleasant and unpleasant pictures of racial in-group (>out-group) members. In summary, these studies provide evidence that perceptual processes may be automatically biased toward in-group members and that these early attentional differences may have implications for downstream memory and PNS activity.

Evaluation

The brain is engaged in an ongoing and continually updating process of evaluating people in the social environment. Evaluations reflect a combination of positive and negative associations toward a person that can be used to guide behavior. Social neuroscience offers the potential for isolating component processes involved in evaluation and exploring how processing goals, motivations and social context affect these component processes. For example, the amygdala, a small structure in the temporal lobe, has been linked to an array of social and affective processes, including learning emotional information

and directing attention to important stimuli. There is also evidence that the amygdala even engages in affective processing when stimuli are presented outside of conscious awareness.

The first fMRI investigation of intergroup processing examined amygdala activity while Black and White individuals saw both Black and White faces. This study found that the perception of racial out-group (>in-group) members is associated with the greatest amygdala activity. Because the amygdala plays an important role in affective processing and people generally prefer in-group members, this study is often taken as evidence for neural-mediated negativity toward racial out-group members.

Several recent experiments have found that amygdala activity to racial out-groups is correlated with implicit measures of racial bias. Implicit measures are designed to measure relatively automatic aspects of evaluation that operate without deliberate thought and sometimes without conscious awareness. Evaluations based on more automatic processing may differ from evaluations that include more controlled processing. For example, most North Americans reveal negative biases toward Blacks, the elderly, or foreigners on implicit measures; yet they report egalitarian attitudes on questionnaires that allow more controlled evaluations of the same groups. Importantly, implicit measures can be a stronger predictor of discrimination than self-report measures in certain circumstances. These studies find that White individuals with a strong implicit preference for White (>Black) people tend to have stronger amygdala activity to Black (>White) faces during fMRI. These data provide an important link between the amygdala, a region known to respond to nonconscious presentations of stimuli, and measures of racial bias that do not rely on explicit report or necessarily conscious awareness. Indeed, the relationship between implicit measures of racial bias and amygdala activity to racial out-group members is even stronger when the faces are presented outside conscious awareness. Although more traditional explicit measures of racial bias that rely on self-report are not correlated with amygdala activity, they are correlated with ERP waves occurring approximately 500 ms after the presentation of faces. These data raise the interesting possibility that responses on explicit measures are linked to downstream information processing, while implicit responses are linked to early, and perhaps nonconscious, information processing in the amygdala.

In addition to valence (positivity/negativity), different groups may evoke specific emotions such as joy, disgust, anger, or fear, depending on the context and the stereotypes associated with the group. The emotions evoked during social perception are likely to impact subsequent information processing and ultimately behavior. Studies have examined brain activity while individuals watch various groups known to be associated with different emotions (envy, pride, pity, disgust). These studies have found that members of groups that typically trigger feelings of disgust (e.g., drug users, homeless people) are associated with less activity in the ventral medial prefrontal cortex (PFC) compared to other groups. The medial PFC is a region of the brain associated with mentalizing about others (i.e., inferring thoughts and intentions) and self-referential processing. The researchers interpreted this decrease in ventral medial PFC as initial evidence of dehumanization – the process by which individuals perceive or treat other people as less than human. These provocative conclusions extend intergroup evaluations beyond mere valence and underscore the importance of emotions on more reflective information processing.

Effects of Social Categorization on Evaluation

There is an extensive evidence that intergroup social categorization and evaluation are closely linked. Perhaps the most compelling demonstration of this link has been classic research on minimal groups. Several famous studies have shown that the simple act of categorizing people into groups is sufficient to generate evaluative preferences for in-group (>out-group) members – even when there is no competition or animosity between the groups. Moreover, anything that heightens the importance or salience of a given social category can have important downstream effects on evaluation. Several studies have explored the effects of intergroup social categorization on amygdala activity.

One way to vary the salience of race as a social category is to vary skin tone (e.g., making White

faces darker and Black faces lighter). Interestingly, White individuals have increased amygdala activity to racial out-group members regardless of skin tone. However, these individuals also have increased amygdala activity to racial in-group members with dark (>light) skin tone. This pattern of results suggests that the salience of a social category (e.g., skin tone) can alter evaluative processing.

Social categorization can also be altered by manipulating explicit goals to categorize individuals according to different dimensions. One study manipulated these goals by having Black and White participants categorize Black and White faces using explicit category labels ('African-American' vs. 'Caucasian') or perceptual information (e.g., matching one Black face to another Black face). When individuals categorized according to perceptual information, they had greater amygdala activity to Black than White people. However, there was no difference in amygdala activity when individuals categorized according to linguistic labels. This research offers evidence that explicit linguistic social categorization can lead people to engage in controlled processes that inhibit evaluative processing in the amygdala.

Individuals can be perceived in terms of their category membership or individual characteristics and focusing on either aspect can modulate the brain regions engaged in evaluation, especially when attitudes toward the category and individual differ. Thinking about novel Black individuals in terms of their racial category membership should activate the amygdala, because this social category has potent evaluative connotations. However, thinking about them as individuals should attenuate this effect because novel individuals should be relatively neutral. As predicted, categorical judgments are associated with more amygdala activity to racial out-group Black (>White) people, presumably because categorical thinking activated evaluative information associated with the racial out-group. In contrast, individual judgments were associated with more amygdala activity to in-group White (>Black) people. These effects illustrate the flexibility of evaluative component processes as a function of current processing goals and the nature of social categorization.

This approach has also been applied to the dehumanization of groups that evoke disgust. Recall that drug users evoke disgust and are associated with less medial PFC activity relative to other groups. However, making individual (>categorical) judgments about drug users increases medial PFC activity. The authors argue that individuation may increase mentalizing about this group and thus increase the extent to which they are processed as human entities. These studies raise the possibility that certain groups may be perceived as less than human unless more in-depth processing goals are instigated.

Social psychological theory also specifies that individuals vary in the extent to which they identify with or categorize themselves as members of social groups. These self-categorizations have important implications for the way in which individuals process members of other groups. Indeed, when individuals mentalize about the opinions and preferences of a person with the same political affiliation as themselves, a region of ventral medial PFC is active – an area of the brain engaged when people think about themselves. However, when they mentalize about a person with a different political affiliation, a region of dorsal medial PFC is active. Moreover, an implicit measure of self-categorization measured the extent to which individuals associated themselves with a political party (Republican or Democrat). Individuals with strong party associations had the strongest activity in the ventral medial PFC to a person who shared their affiliation and the weakest activity in the dorsal medial PFC to a person with the opposite party affiliation. The authors concluded that mentalizing about one's self and people with a similar political affiliation (i.e., in-group members) engages the same set of neural processes whereas dissimilar people engage a different set of processes, and the strength of processing varies as a function of the strength of self-categorization. This study suggests that self-categorization may play an important role in the manner in which people not only categorize and evaluate, but in the way they think about the mental states of others.

Effects of Motivation on Evaluation

Although intergroup social categorization and evaluation have important implications for intergroup relations, much human behavior is ultimately modulated by values, goals, and motivations. The ability of social neuroscience to break down aspects

of intergroup relations into numerous component processes provides a lens for examining the complex interactions between social categorization, evaluation, and motivation. Emotion regulation and motivated processing have received extensive attention by affective neuroscientists and provide a framework for interpreting motivational and regulatory processing in the context of intergroup relations. This section will highlight the motivational flexibility of components involved in intergroup processing.

The study of motivation and controlled processing in intergroup relations has focused extensively on motivations to respond without prejudice toward racial and stigmatized minority groups. People may have internal or external motivations for modulating their evaluations of certain groups. Internal motives include personal values and beliefs that one should be egalitarian and avoid acting or thinking in a prejudiced fashion. External motives include sensitivity to social normative or contextual constraints that discourage the expression or application of prejudice. These motivations appear to interact such that people who report the strongest internal motivations and the lowest external motivations are the least likely to display prejudice in any context. Several studies have explored the relationship between neural activity and these motivations to respond without prejudice.

Initial research on this topic used startle eyeblink responses as a physiological index of amygdala activity. Startle eyeblink is measured by giving people a noxious blast of white noise and measuring the magnitude of their blinking reflex. Eyeblink magnitude increases in the presence of emotionally evocative stimuli and is linked to amygdala activation and is therefore used to index the degree of affective response. While individuals high in internal motivation report less racial prejudice, only individuals who are also low in external motivation reveal less racial bias on a startle eyeblink measure. These data offer initial evidence that affective central nervous system activity to racial out-group members is sensitive to different reported motivations.

Subsequent research has explored the specific neural generators involved in implementing controlled processing during interracial perception. These studies have provided evidence that processes associated with control are engaged at very early stages of intergroup processing. The anterior cingulate cortex (ACC), a region of the brain involved in the detection of potential conflict, may index initial controlled processing. It turns out that the ERN (error-related negativity), an ERP component generated by the ACC, is related to controlled processing during the 'shooter task,' a common measure of automatic stereotypes toward Blacks. Inspired by a horrific incident in New York city in which police shot an innocent Black man while he attempted to pull out his wallet, this task has individuals categorize rapidly presented images of tools or guns following the presentation of Black or White male facial primes. Incorrect responses that reflect racial stereotypes (i.e., tools that were classified as guns following a Black facial prime) are associated with larger ERNs. Moreover, individuals with the largest ERNs to incorrect, but stereotype-consistent responses show the highest levels of controlled processing across the shooter task, consistent with the proposed role of the ACC in signaling the need for additional controlled processing. The ERN can be further decomposed into different subcomponents that track initial dorsal ACC and subsequent rostral ACC activity. While the dorsal ACC is linked to the control of racial bias on the shooter task across conditions, the rostral ACC component is only associated with control in the shooter task among participants with a high external motivation when they are in a public situation. It appears that more rapid, automatic aspects of control are relatively insensitive to the interface between context and personal motivations, whereas later aspects of controlled processing are sensitive to context and motivation. This research helps distinguish multiple component processes that may be involved in enacting motivational agendas to control racial bias and provides additional evidence that later component processes are associated with responses on explicit measures.

Although certain ERP waveforms can be localized to neural generators, fMRI offers superior spatial resolution for identifying the specific brain regions engaged during motivated processing. A number of studies find a negative correlation between amygdala activity to Black (>White) individuals and activity in the lateral PFC, suggesting that some degree of controlled processing modulates biased amygdala activity. Indeed, when faces

are presented outside of conscious awareness, White individuals have greater amygdala activity to Black (>White) faces, and this difference is highly correlated with implicit racial bias. However, when the same faces are presented long enough for conscious processing (*c.* 500 ms), individuals show greater activity to Black (>White) faces in the lateral PFC and ACC and less amygdala activity. Moreover, activity in these frontal regions, which are associated with cognitive control and emotion regulation, is correlated with the decrease in activity in the amygdala to Black (>White) faces under conscious processing. These data suggest that more controlled component processes operate on more automatic evaluative processes, perhaps in the service of motivations to control prejudice, illustrating the complex, interactive aspects of controlled intergroup processing.

A number of social psychological studies illustrate the effects of interracial interactions on controlled processing. White individuals with pro-White racial bias on implicit measures show impaired cognitive ability following an interracial interaction, suggesting biased individuals need to engage in greater levels of controlled processing to successfully navigate interracial interactions. The extra regulatory effort required during interracial interactions leads to subsequent impairments in controlled processing. Interestingly, lateral PFC activity during the perception of Black (>White) faces mediates the relationship between implicit measures of racial bias and impaired cognitive control following an interracial interaction. This research illustrates the value of social neuroscience, showing the relationships between social phenomenon (interracial interactions and racial biases), cognitive processes (control) and neuroscience (lateral PFC), and using neuroscience to help isolate the cognitive operations that mediate real-world social behavior.

There are also groups (e.g., the obese) about whom people feel no motivation to control their evaluations. Although these groups have received little attention in social neuroscience, there is evidence that these normatively stigmatized individuals activate regions associated with affective (amygdala and insula) and controlled processing (ACC and lateral PFC). Moreover, amygdala and lateral PFC activity are positively correlated during the perception and evaluation of normatively stigmatized individuals. Although these data have been interpreted as evidence of inhibition, it seems plausible that controlled processes may also be recruited in certain circumstances to enhance (negative) evaluations toward certain groups.

Research on intergroup relations has been heavily informed by basic research on attitudes and evaluations, including classic research on dissonance. Dissonance is an uncomfortable subjective state induced by conflicting or ambivalent feelings and individuals are often motivated to reduce dissonance by resolving the underlying conflict or ambivalence. A study used EEG to examine the possibility that egalitarian individuals forced to consider working with an angry (vs. happy) Black partner would be likely to experience conflict between their egalitarian motivations and the prospect of working with an angry partner. Indeed, egalitarian individuals had the greatest contingent negative variation (CNV) waves, an ERP component believed to index controlled processing, and took the longest to decide whether or not they would work with the potential partner under these conditions. In contrast, racially biased individuals are quick to reject angry, racial out-group members and have small CNV waves while contemplating their decision. Presumably, these individuals are disposed to reject Black partners and may feel especially justified when the potential Black partner is angry, making the decision to reject these racial out-group members quick and easy. Similarly, ambivalence between implicit and explicit measures of racial bias is associated with ventral lateral PFC activity to Black (>White) faces, providing additional evidence of the recruitment of controlled processing during intergroup ambivalence.

Complexity

Although most laboratory research on intergroup relations focuses on a single social category (e.g., age, sex, race), social reality is complex and real world situations are more likely to be characterized by interactions with people who simultaneously belong to multiple social categories. One of the goals of intergroup research is to understand

how multiple categories are processed. One possibility is that certain categories (e.g., gender) are more important and therefore privileged in processing. A second possibility is that different categories are processing relatively independently and subsequently integrated to create some sort of weighted average during evaluative processing. A third possibility is that individuals use subtypes or superordinate categories. Social neuroscience provides a useful framework for addressing these possibilities by assessing the component processes and timecourse associated with different category information of complex individuals.

The analysis of ERP waves can dissociate aspects of processing multiple social categories. When individuals see people who vary in race and gender, early processing (*c.* 100 ms) is more sensitive to racial outgroup (>in-group) members, while subsequent processing (*c.* 150 ms) is sensitive to differences in gender. Despite the rapid speed with which both of these categories are processed and the brief gap between them (*c.* 50 ms), the high temporal resolution of ERP offers evidence that race and gender are processed as separate social categories during very early stages of perception, perhaps before the visual information from the stimuli reaches conscious awareness. ERP studies illustrate that intergroup processing unfolds rapidly and that different social category information can be processed independently within milliseconds.

Behavior

Ultimately, the study of intergroup relations is concerned with predicting and reducing discriminatory behavior. Several studies have linked neural and physiological processes to discrimination. One provocative study explored the relationship between cultural stereotypes and neural processes on the decision to shoot Black and White people in a videogame environment. Unsurprisingly, people who believed that Blacks were associated with criminality were more likely to shoot them if they were unarmed, making the false assumption that they were carrying a weapon even if it was an innocuous object (e.g., cell phone). Moreover, when individuals made the decision to shoot, they had greater ERP waves to Black (>White) faces during early processing (*c.* 200 ms). These data suggest that individuals rapidly, and perhaps unconsciously, increase their attention to Black individuals when making the decision to shoot armed or unarmed individuals. Moreover, this ERP wave magnitude mediates the relationship between racial stereotypes and racially biased decisions on the shooting task (e.g., shooting unarmed Black individuals). Although these data are correlational, they suggest that the knowledge of cultural stereotypes may lead to increased attention to Black people and rapid acts of discrimination consistent with these stereotypes.

Other research has linked responses in the PNS to discrimination. Whereas facial EMG is implicit in the sense that it can be measured without self-report, it has a slower timecourse than aspects of central nervous system processing indexed by ERP waves and may reflect the output of processing within the central nervous system. It is, therefore, unsurprising that facial EMG is linked to self-reported racial bias and overt acts of discrimination, such as hiring racial minorities. Indeed, facial EMG (specifically cheek activity, associated with smiling) toward racial minorities correlates negatively with decisions to discriminate against racial minorities during hiring decisions. In other words, people with the least positive evaluations of racial minorities according to their cheek activity (i.e., less smiling) are the most likely to exclude Black people from jobs. Interestingly, cheek activity was a stronger predictor of hiring decisions than a more traditional implicit measure of racial bias. One potential explanation for this relation is that facial EMG may reflect more downstream processing than traditional implicit measures, providing a closer temporal link to hiring decisions. Facial EMG also predicts racially biased decision making better than explicit measures, although facial EMG does converge with explicit measures of racial bias when individuals are not motivated to alter their biases toward racial minorities.

Conclusion

The study of intergroup relations from a social neuroscience perspective remains relatively young.

Nevertheless, the last decade of research has revealed several important insights into the complexity of intergroup perception and evaluation. This research has provided exciting evidence of the automaticity of intergroup perception and evaluation, and the complex interactions between the component processes that guide behavior. These studies highlight the speed at which individuals distinguish different groups, their ability to do so without conscious awareness, and their ability to alter these initial processes according to their motivations or goals. Improvements in technology and convergence across methods will add precision and novel insights about an evaluative system that governs intergroup relations. In addition, the insights gleaned from social neuroscience will eventually lead to novel predictions for traditional behavioral investigations and ultimately interventions aimed to improve intergroup relations.

See also: Implicit Social Cognition; Phenomenology of Consciousness; Social Foundations of Consciousness.

Suggested Readings

Amodio DM and Lieberman MD (in press) Pictures in our heads: Contributions of fMRI to the study of prejudice and stereotyping. In: Nelson T (ed.) *Handbook of Prejudice, Stereotyping, and Discrimination*. Earlbaum Press.

Crandall CS and Eshleman A (2003) A justification-suppression model of the expression and experience of prejudice. *Psychological Bulletin* 129: 414–446.

Cunningham WA and Van Bavel JJ (in press) A neural analysis of intergroup perception and evaluation. In: Berntson GG and Cacioppo JT (eds.) *Handbook of Neuroscience for the Behavioral Sciences.* Wiley.

Eberhardt JL (2005) *Imaging race*. *American Psychologist* 60: 181–190.

Ochsner KN and Lieberman MD (2001) The emergence of social cognitive neuroscience. *American Psychologist* 56: 717–734.

Phelps EA and Thomas LA (2003) Race, behavior and the brain: The role of neuroimaging in understanding complex human behaviors. *Political Psychology* 24: 747–758.

Stangor C (2000) Stereotypes and Prejudice. Philadelphia: Taylor & Francis Group.

Stanley D, Phelps EA, and Banaji MR (2008) The neural basis of implicit attitudes. *Current Directions in Psychological Science* 17(2): 164–170.

Biographical Sketch

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