Introduction to the Special Section on Social Neuroscience: Promise and Caveats

Eddie Harmon-Jones and Patricia G. Devine
University of Wisconsin—Madison

This special issue of the *Journal of Personality and Social Psychology: Attitudes and Social Cognition* is devoted to theory and research at the interface of social psychology and neuroscience. The 5 empirical articles represent the theoretical and methodological breadth of issues considered by social neuroscientists. The methods span brain lesion work to neuroendocrinology to psychophysiological indicators of brain activity to functional magnetic resonance imaging indicators of brain activity. The remaining 2 articles consider explicitly some of the promises and pitfalls of social neuroscience; these authors, although noting the power of neuroscience methods, remind readers of the serious challenges posed in trying to examine the biological processes underlying or associated with social psychological phenomena. These articles help to reveal the richness of social neuroscience and the power of neuroscientific methods to address processes and mechanisms that would not be possible with traditional social psychology methods.

Although the interest in examining biological underpinnings of social psychological phenomena has existed for some time (for a review of early research, see Shapiro & Crider, 1969), recent years have seen an increased interest in such research (e.g., Adolphs, 1999, 2003; Blascovich, 2000; Cacioppo et al., 2002; Ochsner & Lieberman, 2001). Several scholars have suggested that neuroscience can contribute to a comprehensive understanding of questions that are at the heart of social psychology (Adolphs, 2003; Cacioppo & Berntson, 1992; Cacioppo et al., 2002; Klein & Kihlstrom, 1998; Ochsner & Lieberman, 2001), and it appears that the results of these investigations are leading to exciting and important developments.

To date, the articles emerging from these programs of research have only infrequently been published in the *Journal of Personality and Social Psychology*[1] (*JPSP*), and because *JPSP* is the field's premiere journal, we think that this is unfortunate. To the extent that the synthesis of social psychology and neuroscience can yield important insights concerning the processing underlying important social psychological phenomena, *JPSP* welcomes such articles. In addition, publishing such articles in *JPSP* guarantees that they reach a major segment of their target audience—social psychologists. Publications addressing the interface of social psychology and neuroscience are cropping up in a wide range of places, but we fear that the scattered nature of these publications may dilute or delay their impact for theory development within our discipline. More generally, we would like those pursuing the interplay between social psychology and neuroscience to see *JPSP* as an outlet welcoming of these new and exciting developments. Our goal in developing this special section was to help reveal to the field (and beyond) the richness and potential of the interplay between social psychology and neuroscience and to reveal the power of neuroscientific methods to address processes and mechanisms that would not be possible with the traditional methodological tools of the social psychologist.

Given these concerns, we planned a special issue on social neuroscience. A widely distributed call for papers was issued in the spring of 2002, with a submission due date in the fall of 2002. All submitted papers were subjected to peer review, and in the review process, we ensured that each paper was reviewed by at least two types of individuals: individuals who are social psychologists and experts on the social psychological topic but may not have had neuroscience training, and individuals who are experts in the neuroscientific measure(s) used. We were impressed with the broad set of topics and methods represented in the submitted papers. In addition, we were fortunate to have received excellent reviews from a large cross section of individuals. The result of this process is the current collection of articles, which represent a methodologically and theoretically broad and rich set of articles.

Correspondence concerning this article should be addressed to Eddie Harmon-Jones or Patricia G. Devine, Department of Psychology, University of Wisconsin—Madison, 1202 West Johnson Street, Madison, Wisconsin 53706-1611. E-mail: eharmonj@wisc.edu or pgdevine@wisc.edu

[1] There are exceptions, however. See, for example, Amodio, Harmon-Jones, and Devine, 2003; Cacioppo, Crites, Gardner, and Berntson, 1994; Cohen, Nisbett, Bowdle, and Schwarz, 1996; Eisenberg et al., 1991; Elkin and Leippe, 1986; Greenberg et al., 1992; Harmon-Jones and Sigelman, 2001; Ito, Larsen, Smith, and Cacioppo, 1998; Levenson, Carstensen, and Gottman, 1994; Petrie, Booth, and Pennebaker, 1998; Tomaka, Blascovich, Kibler, and Ernst, 1997; Uchino, Cacioppo, Malarkey, and Glaser, 1995; Vanman, Paul, Ito, and Miller, 1997; Wright, Contrada, and Patane, 1986.

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We believe these articles illustrate well the potential of neuroscience to inform social psychological inquiry.

Defining Social Neuroscience

The neuroscientific study of social psychology has been characterized (and is characterized) by many different names (e.g., *social neuroscience*, *social cognitive neuroscience*, *social psychophysiology*); following from the various labels, the definitions are more or less inclusive of various methods. At the outset, we would like to be clear that we conceive of social neuroscience rather broadly and along the lines suggested by others (Cacioppo & Berntson, 2002). Social neuroscience is an integrative field that examines how nervous, endocrine, and immune systems are involved in sociocultural processes. Being nondualist in its view of humans, it recognizes the importance of understanding the neural, hormonal, and immunological processes giving rise to and resulting from social psychological processes and behaviors. Social neuroscience also emphasizes the understanding of how the brain influences social processes as well as how social processes can influence the brain. In other words, to understand mechanisms underlying mind and behavior, both biological and social approaches are needed (Cacioppo & Berntson, 2002). However, this is not to say that a biological approach using molecular levels of analysis is necessary (or preferred) for all of social psychology; indeed, more molar levels of analysis, such as those used in much social psychology, provide useful and important ways of understanding some complex behaviors.

The Promise of Social Neuroscience

Social neuroscience, in our estimation, holds considerable promise for illuminating phenomena that have always been at the heart of our discipline. In addition, using neuroscience methods to explore social psychological phenomena has the potential to inform neuroscience theory and research by recognizing that people are both social and biological beings.

Emerging research is helping to illustrate how neuroscientific research and theory can inform social psychology. As an example, consider research by Amodio et al. (in press). Integrating ideas from cognitive neuroscience models of cognitive control (Carter et al., 1998; MacDonald, Cohen, Stenger, & Carter, 2000) with social psychological models of control of race bias, Amodio et al. predicted that when individuals confronted a conflictual situation that activated a tendency toward stereotypic thinking as well as a belief that stereotyping is inappropriate, they would evidence heightened activity in the anterior cingulate cortex. Using event-related brain potentials (ERPs), the research revealed support for the prediction, demonstrating that the activation occurred at very early stages of response execution. Such findings suggest that the detection of conflict likely operates below awareness and does not necessarily rely on conscious deliberation, as proposed by existing social psychological models of cognitive control (e.g., Monteith, 1993; Wegener & Petty, 1997; Wilson & Brekke, 1994).

The direction of influence and insights, however, is likely to flow in both directions. That is, recent work has also illustrated how the neuroscientific study of social processes can inform neuroscientific research and theory by pointing to the importance of self-representations and social situations (from context to culture) in altering neural, hormonal, and immunological processes. In a dramatic illustration of this point, Crabbe, Wahlsten, and Dudek (1999) found that the specific behavioral effects associated with certain gene inactivations in mice varied widely across environmental contexts. In other words, genes did not directly influence behavior; the situational context was important in determining how particular genes affected behavior.

In addition, the integration of neuroscience into social psychology allows researchers to use what is known about neuroscience to test predicted processes underlying social phenomena. These developments are important because the use of neuroscience methods may provide information about process and mechanism that would be impossible to assess using other techniques. In one such test, Lieberman, Ochsner, Gilbert, and Schacter (2001) were interested in assessing whether conscious awareness of a cognitive discrepancy was necessary for cognitive dissonance reduction to occur, as some past models of dissonance had proposed. To test this idea, they invited amnesic patients who would not be able to remember the experimentally engineered event that aroused the cognitive discrepancy (i.e., free choice situation) and assessed these patients' dissonance reduction via attitude change, as done in numerous studies (e.g., Brehm & Cohen, 1962; Festinger, 1964; Harmon-Jones & Mills, 1999). Results indicated that even the amnesic patients changed their attitudes following the arousal of dissonance, suggesting that conscious awareness of the cognitive discrepancy is not necessary for dissonance reduction to occur.

Finally, social psychology can contribute its methodological tools to the study of neuroscience theories and research. As an example, consider the following. Some affective neuroscientists had proposed that the left frontal cortical region was involved in the expression of positive affect, whereas others had posited that the left frontal cortical region was involved in approach motivation. Because all of the experimental tests of the emotional–motivational function of left frontal activity had confounded positive affect with approach motivation, by examining emotions such as joy that are both positive and evoke approach motivation, the question of whether the left frontal region was involved in positive affect or approach motivation (or some combination) was left unaddressed. Using social psychological methods to manipulate motivational intensity and induce anger, a negative emotion that is often associated with approach motivation, Harmon-Jones, Sigelman, Bohlig, and Harmon-Jones (2003) provided experimental evidence indicating that left frontal activity was related to approach motivation and not positive affective valence.

Cautions

Although there is currently much enthusiasm for integrating neuroscience into social psychology, the greatest progress is likely to ensue if such enthusiasm is tempered by appropriate cautions. Though a neuroscience approach is tremendously powerful, we believe, it is important to recognize the potential limitations of this approach. As noted previously, for example, some issues and phenomena examined by social psychologists may not be reducible to a neuroscience (and hence more molecular) level of analysis. Although this is ultimately an empirical question, we would discourage wholesale abandonment of more molar levels of analysis in favor of consideration of molecular processes that may also be involved in social thought, emotion, and behavior. Indeed, in

agreement with others (e.g., Cacioppo & Berntson, 2002; Willingham & Dunn, 2003), we believe that both molar and molecular levels of analysis are important for understanding social psychological issues and that the most comprehensive and powerful theories will follow from efforts to examine and synthesize processes across levels of analysis.

Further, we believe that common misconceptions about the nature of social neuroscience can lead people astray in understanding its goals and promise. For example, many observers may think that social neuroscience is simply aimed at mapping social psychological processes to activity in particular brain regions. Although this type of research exists and provides information about the importance of particular brain structures in performing various tasks, this is by no means the only or the most important function of a neuroscience approach to social psychology. Brain mapping of social processes itself creates difficult challenges, both empirically and theoretically. Empirically, for example, it is very difficult to verify with certainty that a particular structure is involved with only one psychological process, especially when the process is as complex as many discussed in social psychology (see Cacioppo et al., 2003; Willingham & Dunn, 2003).

Theoretically, caution is warranted regarding the issue of assuming one-to-one relationships between physiological constructs and psychological constructs. A number of contemporary explorations into social neuroscience have proposed that certain brain structures exist only for face processing, love, and so on. As Cacioppo et al. (2003) discuss, it is very difficult to empirically verify such one-to-one relationships, especially with complex phenomena like social psychological processes. At the very minimum, such assumptions are likely to be misleading for theory development and refinement.

Overview of the Current Issue

The articles in the current issue represent the theoretical and methodological breadth of issues considered by social neuroscientists. The methods span brain lesion work to neuroendocrinology to psychophysiological indicators of brain activity to functional magnetic resonance imaging (fMRI) indicators of brain activity. These methods each have different strengths and weaknesses, but in their application to basic social psychological phenomena, we found that the articles reveal the potential power of neuroscience theories and methods for informing social psychological analyses. It is clear that the insights gleaned from these studies would not have been forthcoming without the appropriate application of neuroscience methods to the social psychological phenomenon of interest.

The first article illustrates the importance of using lesion methods (i.e., in which a particular brain structure is removed due to accident or disease). These methods have the potential to reveal how a compromised brain system can disrupt typically well-regulated social psychological processes. Using this approach, Beer, Heerey, Keltner, Scabini, and Knight (2003) report the results of a study comparing patients with orbitofrontal damage, who fail to regulate their behavior, to matched controls on a variety of tasks aimed at assessing the regulatory function of self-conscious emotions. On the basis of the hypothesis that self-conscious emotions are important for regulating social behavior, Beer et al. predicted and found that the patients with orbitofrontal damage had inappropriate self-conscious emotions and were impaired in interpreting the self-conscious emotions of others.

The second article highlights the importance of examining both social and biological processes that may be involved in adaptive functioning. Specifically, Taylor, Lerner, Sherman, Sage, and McDowell (2003) report the results of a study aimed at assessing whether self-enhancing cognitions are associated with healthy biological profiles. Self-enhancement has been described as a positive illusion that fosters health and longevity (e.g., Taylor & Brown, 1988). However, self-enhancement has also been described as defensive neuroticism that can cause physiological and neuroendocrine damage (e.g., Shedler, Mayman, & Manis, 1993). To test these competing predictions, Taylor et al. examined cortisol levels and cardiovascular reactions to a laboratory stressor. Consistent with the positive illusions prediction, results indicated that high self-enhancers had lower cardiovascular responses to stress, more rapid cardiovascular recovery, and lower baseline cortisol levels. In many ways, it is obvious that humans are both biological and psychological beings, but the present work helps to illustrate in a compelling way how consideration of the interplay between psychological and biological processes may be important to promote adaptive biological and psychological functioning.

The next two articles each used ERPs to examine basic social psychological processing involved in social categorization (Ito & Urland, 2003) and inconsistency resolution in impression formation (Bartholow, Pearson, Gratton, & Fabiani, 2003), phenomena that have long been of interest to social psychologists. The ERP methodology, however, allows examination of the neural events associated with such processes as they unfold over milliseconds. These methods thus offer the advantage of capturing early forms of processing that then play out in terms of explicit social categorization and impression formation.

Ito and Urland (2003), for example, examined the degree to which perceivers automatically attend to and encode social category information about individuals who are members of multiple social categories. Results indicated that attention was preferentially directed to Black targets (as compared with White targets) very early in processing (by about 100 ms after stimulus onset). Still very early in processing but about 50 ms later, attention was directed to gender. Later working-memory processes were sensitive to more complex relations between the group memberships of a target individual and the surrounding social context.

Also using ERPs, Bartholow et al. (2003) examined the effects of experimentally induced alcohol intoxication on person perception, particularly when the target persons act in expectancy-incongruent ways. The use of drugs such as alcohol, which are known to impair certain brain functions, is another neuroscience technique that can inform research on social psychological processes. Consistent with predictions, expectancy-inconsistent behaviors elicited larger late positive (LPP) ERP amplitudes and were recalled better than expectancy-consistent behaviors. However, alcohol and the valence of initial expectancies moderated these effects. For individuals not given alcohol (placebo group), positive targets performing negative behaviors elicited the largest LPP responses and were recalled best. In contrast, for individuals given alcohol, negative targets behaving positively elicited the largest LPP and were recalled best. The results obtained by Bartholow et al. suggest that alcohol does not globally impair

working-memory processes in person perception but alters the nature of valenced information processing.

fMRI has emerged as a powerful tool for measuring brain activity noninvasively in humans and is particularly powerful in its ability to provide excellent spatial resolution. Cunningham, Johnson, Gatenby, Gore, and Banaji (2003) used fMRI productively in their investigation of automatic and controlled evaluative responses. In their experiment, participants made either evaluative (good–bad) or nonevaluative (past–present) judgments about famous names. Results indicated that greater amygdala activity occurred for names rated as "bad" relative to those rated as "good," regardless of whether the task explicitly involved an evaluative judgment (good–bad) or not (past–present). In addition, evaluative judgments resulted in greater medial and ventrolateral prefrontal cortical (PFC) activity than nonevaluative judgments. Furthermore, greater ventrolateral PFC activity occurred with evaluative judgments that were associated with greater ambivalence. From these results, Cunningham et al. inferred that automatic processes are sensitive to simple valence and controlled processes are sensitive to attitudinal complexity. Such findings may ultimately inform not only theories of evaluative processing but also theories of attitudinal ambivalence, both issues that have long been at the center of social psychological theory and research.

The final two articles in the special section are not empirical articles but rather are articles that considered explicitly some of the promises and pitfalls of social neuroscience. Indeed, the authors of these articles, although recognizing the power of neuroscience methods, remind readers of the serious challenges posed in trying to examine the biological processes underlying or associated with social psychological phenomena. In essence, these authors call for judiciousness in the use of such methods and encourage caution in making inferences about social psychological experiences from neuroscience data.

In the first of these articles, Cacioppo et al. (2003) reviewed a number of issues that researchers and readers alike should consider when evaluating social neuroscience research. Regarding the localization of function to specific brain regions, Cacioppo et al. suggest that it may be difficult to localize some social psychological processes, which involve a number of more basic processes, because the neural structures involved may be greatly distributed in the brain. Cacioppo et al. go on to suggest another important principle that should be considered when evaluating social neuroscience research—that of making appropriate inferences from neuroscience data. Finally, Cacioppo and colleagues wisely argue that the specification of relationships between physiological constructs and psychological constructs cannot come from studies that measure physiology alone. To fully specify such relationships, the brain region (structure or system) needs to be manipulated as well, and its effects on psychological constructs need to be measured.

In the final article, Willingham and Dunn (2003) discuss the attempt to relate psychological events to specific locations in the brain. They discuss some of the pitfalls of attempting to localize brain activity that supports social behavior and suggest strategies psychologists can use to integrate brain localization data and psychological theory. They conclude that brain localization may offer useful tools for some but not all problems in social psychology, and they point to particular problems where brain localization would not be useful.

We are excited by the articles published in this issue. Though we recognize that social neuroscience is still in its infancy, we believe these articles highlight the potential of the synthesis of social psychology and neuroscience to yield important insights about social emotion, thought and behavior. We hope readers share our enthusiasm and are similarly excited, inspired, and challenged by the issue. We believe the use of neuroscience methods introduces new challenges, and we expect that as work spanning levels of analysis continues to develop, we in the field will reap benefits, both theoretical and empirical. Our hope is that the articles in this issue will stimulate additional work and lead to new insights concerning interplay between social psychology and neuroscience and, in so doing, enrich both areas of inquiry.

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