

ARTICLE

Social Neuroscience at The College of Saint Rose: The Art of Team Teaching in Emerging Areas of Psychological Science

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Social neuroscience is a relatively new multidisciplinary field which merges the more reductionistic approaches of neuroscience with the more molar perspectives of social psychology. In this article we report the joint efforts of the authors to develop an effective team-taught course in social neuroscience at the undergraduate level. We review our experiences in developing this course, detail many of the sources currently available for social neuroscience, and provide the results of a detailed student survey of the

course. In addition to providing a foundation for others interested in developing a social neuroscience course, it is our opinion that many of the experiences we describe here are applicable to any novel multidisciplinary team teaching endeavor, especially those merging psychological disciplines with neuroscience.

Key words: team teaching, social neuroscience, undergraduate education

The study of the neurobiological substrates of behavior and cognition represents one of the predominant foci in neuroscience. Inherent in this approach is a connection to virtually all subdivisions within the field of psychology, creating an enormous number of potential mergers between these two disciplines. As professors and researchers alike have embraced multidisciplinary approaches, new emphasis has been given to merging neuroscientific concepts with psychological perspectives. Some of these mergers are, historically, quite old while others are relatively young. For example, the biological basis of behavior and cognition from a developmental perspective has a long history. Journals such as *Developmental Psychobiology*, whose first issue was published in 1968, and *Developmental Neuroscience*, whose first issue was printed in 1978, have provided outlets for work in this field for some time. In contrast, mergers between areas such as social psychology and neuroscience are comparatively much newer. The first issue of the journal *Social Neuroscience* was printed in 2006, as was the journal *Social, Cognitive, and Affective Neuroscience*.

The American Psychological Association currently has 54 separate divisions, many of which have a relatively short history, or no history at all, when it comes to considering neurobiological mechanisms. Some recent books and chapters that reflect this new neuroscience perspective in APA divisions include *The Neuroscience of Psychotherapy: Building and Rebuilding the Human Brain* (Cozolino, 2002), *The Neuroscience of Human Relationships: Attachment and the Developing Social Brain* (Cozolino, 2006), *Neurobiology for Clinical Social Work: Theory and Practice* (Applegate and Shapiro, 2005), *The Neuroscience of Religious Experience* (McNamara, 2009), *Advances in the Neuroscience of Addiction* (Kuhn and Koob, 2010), and *Personality Neuroscience: Explaining Individual Differences in Affect, Behavior, and Cognition* (DeYoung and Gray, 2009), to name but a few. With the growing availability of journals and textbooks integrating

neuroscientific principles with diverse behavioral and cognitive components, faculty who teach undergraduate courses are provided with many opportunities to develop timely and cutting-edge courses for their students.

One of the greatest obstacles to developing new courses in areas combining neuroscience and psychology is that faculty often lack the expertise in two, previously separate disciplines that would permit them to easily synchronize the material into a coherent course. Furthermore, despite the growth of graduate programs in neuroscience, undergraduate programs, particularly at small liberal arts institutions, are less likely to have specialized neuroscientists on staff in their departments. As a result, such institutions may sometimes appear limited with respect to their ability to offer unique interdisciplinary courses involving neuroscience. A joint or team-teaching approach to such courses provides a powerful mechanism to effectively hurdle this obstacle, and in the process, may provide unique opportunities for further collaboration and scholarly work among faculty.

In this article we will review our experiences with developing a team-taught course in social neuroscience at The College of Saint Rose. In doing so, we will describe the way in which we approached this project, review the challenges and obstacles we faced, explain the course details, and present the results of a course-specific questionnaire used to assess the course's success.

MATERIALS AND METHODS

Social Neuroscience Resources. In preparation for this course, we reviewed a number of different sources in an attempt to find a suitable text geared toward the traditional undergraduate student. The relative novelty of this field led to our discovery that there are very few suitable social neuroscience texts available, many of which are likely too difficult for undergraduate students. A brief summary of the pros and cons we considered with each of these sources is presented in Table 1.

<u>Text/Articles</u>	<u>Pro</u>	<u>Con</u>
The journal "Social Neuroscience" The journal "Social, Cognitive, and Affective Neuroscience"	<ul style="list-style-type: none"> • Provides the most up-to-date information • Provides students with a clear picture of the way social neuroscience research is conducted 	<ul style="list-style-type: none"> • May not provide students with a comprehensive understanding of each topic (given the often narrow scope of any particular study)
<i>Essays in Social Neuroscience</i> (Cacioppo and Berntson, 2004)	<ul style="list-style-type: none"> • Essays written by experts in various areas of social neuroscience • Essays are written with less emphasis on technical terms and a long list of citations, and more emphasis on theoretical contributions 	<ul style="list-style-type: none"> • The brevity of the book necessitates less comprehensive coverage than what is found in other texts
<i>Social Neuroscience Key Readings</i> (Cacioppo and Berntson, 2005)	<ul style="list-style-type: none"> • Readings are selected from a variety of journal sources. • The collection of readings shows the breadth of the field • Readings are easily understood by the typical upper-level undergraduate student 	<ul style="list-style-type: none"> • Reading selected articles may not give students as good of an understanding of the topic as a whole as would reading a review chapter
<i>Foundations in Social Neuroscience</i> (Cacioppo et al., 2002)	<ul style="list-style-type: none"> • The most comprehensive source for social neuroscience; contains 83 chapters • Edited book provides review chapters written by experts 	<ul style="list-style-type: none"> • Written at a level higher than undergraduates are likely to understand • Given the explosion of the field, a book published in 2002 is likely to have outdated material
<i>Social Neuroscience</i> (Cacioppo, Visser and Pickett, 2006)	<ul style="list-style-type: none"> • Edited book provides review chapters written by experts • Focuses on social cognition from a neuroscience perspective 	<ul style="list-style-type: none"> • The focus of the text on social cognition does not allow students to gain an understanding of other areas of social neuroscience
<i>Social Neuroscience: Integrating Biological and Psychological Explanations of Social Behavior</i> (Harmon-Jones and Winkielman, 2007)	<ul style="list-style-type: none"> • Edited book provides review chapters written by experts • A wide breadth of topics are included • Chapters written in an interesting manner 	<ul style="list-style-type: none"> • Understanding material often requires preexisting knowledge of social psychological theory and/or neuroscience research

Table 1. Pros and cons of adopting various texts or journal articles for an undergraduate class in Social Neuroscience.

The greatest challenge we faced was finding a text that would be accessible to undergraduate students. While the sources we reviewed were all excellent, they appeared to be predominantly geared toward graduate students or a more professional audience. As a result of our review, we decided to adopt the *Social Neuroscience: Key Readings* text compiled by Cacioppo and Berntson (2005), knowing that we would also be incorporating articles published more recently in primary sources (see Additional Required Readings at the end of the article).

Course Design. In developing this course we chose to combine a traditional lecture-style course with a more informal seminar-style course, adopting what we perceived to be the primary strengths of each design. Lectures were designed with a conscious effort to truly integrate the material and its presentation to the students. A list of the topics included or considered for the course is displayed in

Table 2. PowerPoint slides were used to create a single lecture on a topic, where one professor would introduce the topic and the primary social psychological characteristics, another professor would discuss the detailed neurobiological mechanisms linked to those phenomena, and then the first faculty member would return to the podium to sum up the material from a more macro perspective. Most lectures proceeded in this format, although students frequently asked questions of one faculty member or the other that would require the integration of neuroscience and social psychological principles, and thus both faculty would provide responses. While designing these lectures required a great deal of coordination and work, integrating the material was extremely educational and intellectually stimulating for both faculty.

In addition to the lectures, students were assigned readings from the Cacioppo and Berntson (2005) text and

Social Neuroscience Topics

1. Social and Emotional Information Processing in the Brain
2. Neuroanatomy of Emotion and Affective Style
3. Neural Aspects of Emotional Intelligence
4. Motivational Analysis of Emotions
5. Neural Circuitry and Rewards
6. The Neuroscience of Self-Regulation
7. Neural Substrates of Social Cognition
8. Memory and Social Cognition
9. Neuroscience of Empathy
10. Neuroscience of Theory of Mind Reasoning
11. Neuroscience and Attitudes
12. Neural Aspects of Negativity Bias
13. Prejudice and the Amygdala
14. ERPs and Person Perception
15. Biological Effects of Prejudice
16. The Reciprocal Nature of Social Interaction and the Brain and Body
17. The Biology of Shyness and Sociability
18. Biology, Attachment, and Love
19. Social Neuroscience of Aggression

Table 2. Social Neuroscience topics covered or considered for coverage in our course.

articles from primary sources, predominantly the journal *Social Neuroscience*. One student was assigned as the discussion leader for the article while the rest of the class was required to generate two questions which could be raised following the discussion leader's article summary. The discussion leader was graded based on his/her article review and ability to respond to questions raised by classmates. Student generated questions were graded based on how well they critically addressed issues raised in the article while at the same time, providing a clear rationale for raising that question.

Three exams containing a combination of multiple choice questions and short essays were interspersed throughout the term to assess students' knowledge of social neuroscience. All essay questions required students to focus on integrating both social psychological and neuroscientific information.

The last course requirement was the development of a research proposal and the presentation of this proposal to the class. In a series of stages throughout the term, students developed a topic, acquired primary sources, designed a hypothetical experiment, considered potential outcomes, and incorporated these things into a brief conference-style PowerPoint presentation which was delivered to the entire class at the end of the semester. In addition to being graded on things such as the content of the presentation and presentation style, students were graded on how well they responded to questions following their presentations. During these presentations, classmates were graded on their participation, where the quality of their questions and the relevance to social neuroscience were considered. Thus, throughout the assignments for this course there was a conscious effort on the part of the faculty to require students to integrate

materials from both social psychology and neuroscience in order to discern new knowledge.

A Typical Day of Class. The usual class began with one or two article discussions. The student assigned to a particular article sat at the front of the class with the instructors and provided a brief summary (about 5 minutes on average) of the article that everyone had read. The rest of the students then had the opportunity to raise questions, often based on typed questions they had generated. The student leader responded to these questions and the instructors chimed in when necessary. The typical article discussion lasted 15-20 minutes. We normally did the articles at the beginning of each class to make sure that the student(s) who had prepared for their presentations/discussions would have sufficient time.

The article presentation was followed by an introduction to the daily lecture topic. This sometimes involved summarizing or recapping what was discussed at the end of the previous class as well as providing an overview of the material to be covered during the present class period. As an example of a typical lecture, we can review our coverage of social and emotional processing in the brain. For this material, we formulated a specific set of slides using PowerPoint. Each slide had one of the instructor's names in the lower right corner so that students would be able to clearly record which instructor presented that material in their notes. In this case, Dr. Dorr began the section by introducing the topic, referencing some research by Jennifer Beer (2007), and indicating upcoming coverage of the orbitofrontal cortex, theories of social and emotional processing in the brain, and future research. Much of the content for this lecture was taken from Beer (2007). Dr. Flint then reviewed the neuroanatomy of the orbitofrontal cortex (Kolb and Whishaw, 2009) including Brodmann's areas, primary and secondary afferents, and efferent connections with the amygdala and hypothalamus. Dr. Dorr then discussed research on the orbitofrontal cortex and its role in emotional decision making and judgments of social stimuli. This was followed by a review of the somatic marker hypothesis, reinforcement and reversal, and the dynamic filtering theory by Dr. Flint. Lastly, Dr. Dorr drew conclusions regarding the role of the orbitofrontal cortex in social and emotional processing based on the material that had been presented and spent time discussing some additional findings from primary research on related topics such as the experience of discrete emotions in patients with orbitofrontal cortex lesions in interpersonal relationships and issues of embarrassment.

Throughout the lectures students were encouraged to ask questions, and frequently did. On occasion this led to interesting discussions involving the expertise of both faculty. At the conclusion of each class period, students were required to turn in their typed questions for articles that had been assigned and presented that day.

Human Participants. At the conclusion of the course, students were presented with an anonymous questionnaire and demographic survey. These materials were approved by the College's Institutional Review Board for research

with human participants prior to their administration in class. The completed materials were maintained in sealed envelopes by the Dean of Mathematics and Sciences until after final course grades were submitted by the faculty.

The sample was comprised of 15 students majoring in psychology and enrolled in the elective social neuroscience course at The College of Saint Rose. The mean age of the group was 22 years ($SE = 0.45$) and all participants reported their race/ethnicity as Caucasian/ White. Four of the 15 students were male and six students were juniors with the remaining having senior status. Although there were no course prerequisites other than one of the department's two Foundations of Psychology courses, and there were no restrictions based on major, minor, concentration, or career goal, the results of demographic questions displayed in Table 3 reveal a good deal of diversity in the sample for these issues.

The course questionnaire contained a total of 14 questions which were divided into two broad categories; questions associated with the team-teaching format of the course ($n = 8$) and questions associated with the social neuroscience content ($n = 6$). Students responded to these questions on a 5-point Likert scale, where 1 = disagree strongly, 3 = neutral, and 5 = agree strongly. In addition to these 14 questions, there were 2 open response questions at the end of the questionnaire. The first open response question asked students to indicate their favorite topics covered during the course, while the second solicited comments, suggestions, and criticisms that might allow the professors to improve the course in the future.

<u>Demographic Category</u>	<u>Frequency</u>
<i>Minor:</i>	
Biology	1
Criminal Justice	1
Communications	1
English	1
Computer Science	1
None Indicated	10
<i>Concentration:</i>	
Clinical/Counseling	4
Health Psychology	1
Industrial/Organizational	1
Behavioral Neuroscience	0
None Indicated	9
<i>Currently or Previously Enrolled in:</i>	
Social Psychology	13
Neuropsychology	7
Physiological Psychology	4
<i>Plans to Attend Graduate School in:</i>	
Psychology	12
Neuroscience	2
None Indicated	1

Table 3. Frequencies for sample demographics.

RESULTS

Results from the questions on the questionnaire were examined using two-tailed one-sample t-tests with a

comparison value of 3 (see Tables 4 & 5). To highlight a few of the results, students believed they "gained a better understanding of the material through the team-teaching format than they would have from a single instructor," $M = 4.4$, $t(14) = 5.96$, $p < .001$, and that the "individual expertise of each faculty member was necessary for this course," $M = 4.8$, $t(14) = 16.84$, $p < .001$. Students also indicated they "enjoyed the opportunity to take such a unique course in such a new area of psychology," $M = 4.4$, $t(14) = 5.96$, $p < .001$.

We also assessed the extent to which students found the different components of the class useful. They rated the lecture presentations, $M = 4.5$, $t(14) = 11.5$, $p < .001$, article discussions, $M = 4.2$, $t(14) = 5.39$, $p < .001$, and research proposals, $M = 4.3$, $t(14) = 6.14$, $p < .001$, as contributing to their knowledge of social neuroscience.

Examination of the open-ended response questions regarding the favorite topics covered in the course revealed a wide variety of responses including social bonding, power motivation, empathy, love, and aggression, but by far the most frequent response was prejudice (racial/ethnic bias), with 10 students indicating it was a favorite topic. With respect to the open question on comments, suggestions, and/or criticisms, three students suggested that there were too many readings (articles) and that it became overwhelming at times. However, one student commented that, "I enjoyed reading articles – it gave a chance to keep up with and have an idea of one current research in this field." Two students indicated that they like the research proposal assignment, with one student suggesting that it was scary, but an "efficient" way of "getting us to learn the material." Lastly, our favorite comment read, "I don't even really care what my grade is in this class. I loved it and learned so much I'm glad I took it."

Despite the apparent overwhelmingly positive nature of the student course evaluations, such instruments and their corresponding results should be considered within the broader context of course evaluations. Research suggests that student course evaluations are relatively reliable (Cranton and Smith, 1990; Langbein and Snider, 1999). However, as Langbein and Snider indicate in their study, the validity of student course evaluations is highly debated, with evidence suggesting that evaluation may be related to student performance, course characteristics, and even unrelated factors such as the instructor's age and student gender (Abrami et al., 1990; Darby, 2007; Goldberg and Callahan, 1991; Kierstad et al., 1988; See Langbein and Snider, 1999 for a more comprehensive list of references). In a more recent study, Heckert, Latier, Ringwald-Burton, and Drazen (2006) reported that, contrary to the impressions of many, evaluation was not related to expected course grade, but instead was associated with student effort and difficulty appropriateness as discrete concepts (see also Baird, 1987).

Placing our course into the context of this literature on course evaluations, we would like to believe that our evaluations more likely reflect student impressions of the course and instructors than alternative factors. For example, only one student in the course was not present to complete the evaluation, and yet the final grade distribution

Social Neuroscience Student Questionnaire: Team Teaching Questions				
Question	Mean	SE	t	p
Q1. Both instructors appeared to contribute significantly to the course.	4.67	0.13	13.23	<.001
Q2. The instructors worked well together in the classroom.	4.67	0.16	10.46	<.001
Q3. The team-teaching format that the instructors used helped me better understand the material.	4.33	0.21	6.33	<.001
Q4. The individual expertise of each faculty member was necessary for this course.	4.80	0.11	16.84	<.001
Q5. I gained a better understanding of the material through the team-teaching format than I would have from a single instructor.	4.40	0.24	5.96	<.001
Q6. I enjoyed the team teaching format more than a traditional single-instructor classroom format.	4.07	0.18	5.87	<.001
Q7. I think that other multidisciplinary courses should be offered in a team-teaching format.	4.20	0.17	6.87	<.001
Q8. I enjoyed the opportunity to take such a unique course in such a new area of psychology.	4.40	0.24	5.96	<.001

Table 4. The mean and standard error (SE) for the 8 questions from the Social Neuroscience Questionnaire that addressed team-teaching issues are reported here. Also displayed are the results of a two-tailed one-sample t-test (comparison value = 5) for each question. Note: $p \leq 0.05$ is considered statistically significant.

Social Neuroscience Student Questionnaire: Social Neuroscience Questions				
Question	Mean	SE	t	p
Q1. The course included sufficient “social” and “neuroscientific” content.	4.73	0.12	14.67	<.001
Q2. I gained an increased knowledge of social neuroscience by taking this course.	4.67	0.13	12.23	<.001
Q3. I gained an increased knowledge of social neuroscience through the lecture presentations.	4.53	0.13	11.50	<.001
Q4. I gained an increased knowledge of social neuroscience through the article readings, question generation assignment, and article discussions.	4.20	0.22	5.39	<.001
Q5. The research proposal activity allowed me to apply my knowledge of social neuroscience in an area of interest to me.	4.27	0.21	6.14	<.001
Q6. I would recommend this course to my friends.	4.07	0.25	4.30	.001

Table 5. The mean and standard error (SE) for the 6 questions from the Social Neuroscience Questionnaire that addressed the social neuroscience content reported here. Also displayed are the results of a two-tailed one-sample t-test (comparison value = 3 for each question. Note: $p \leq 0.05$ is considered statistically significant

indicated that seven students were in the A range, five students were in the B range, three students were in the C range, and one student earned an F. Although this distribution is positively skewed, it certainly contains a range of grades that does not easily account for the overwhelmingly positive course evaluations. In addition, the course instructors were male and female, as were the students in the course, although there were more females. Lastly, the open-ended response questions were quite positive, and virtually all students provided responses to some of these open-ended questions. One might expect that the less motivated student would be less likely to provide open-ended responses.

DISCUSSION

Our primary objective in developing this course was to provide undergraduate students access to new and developing content merging the fields of social psychology and neuroscience. By all measures, this endeavor was highly successful. Student responses to the variety of items on the questionnaire were positive. We feel

relatively confident that our first attempt to integrate the material for a social neuroscience course was highly successful.

Based on our experiences, here are the top six things to consider for those who wish to develop their own team taught social neuroscience course or, for that matter, wish to try team teaching in general.

1. Select a colleague with whom you will likely be able to work with effectively. Consider your work ethics, background, productivity, experience, and willingness to commit to the project.
2. Do your homework prior to starting the course. Review the available course materials for faculty and students, establish the course objectives, develop the course assignments, and create a course syllabus that you both agree with.
3. Set aside time for regular (weekly) meetings to discuss upcoming class periods. Co-teaching requires considerably more time and effort than teaching a new course alone. The instructors must develop the lectures together, and then organize them in a manner

that represents the integrative nature of the material.

4. Consider support from your department and/or administration. Will both contributing faculty receive full course compensation even though they will be co-teaching the same course? Are there additional time constraints that could be alleviated with a course reduction? As a neuroscience course, is there a lab component, and if so, is there support for the equipment and disposables necessary to complete the lab exercises?
5. Work to establish an environment where each class period represents an integration of both areas. Avoid having one faculty member lecture one day and another on another day. Both faculty should be present and should utilize a collaborative approach.
6. Challenge students to integrate the material from the different areas in all possible instances, whether it is in the generation of questions from readings, responses to exam questions, or hypothetical research proposals.

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