

## Allegheny College Hosts Neuroscience and Humanities Summer Institute

**Emily M. Macel**

*Neuroscience Program, Allegheny College, 520 North Main Street, Meadville, PA 16335.*

The Neuroscience and Humanities Summer Institute, hosted by Allegheny College, opened doors of opportunity, perception, and creativity for faculty and students across the nation. Offered first in 2002, and a second time in June of 2004, this weeklong event was designed to provide a medium for fostering development of interdisciplinary courses linking neuroscience and the humanities (e.g., the fine arts, philosophy and language). During the Institute, participants attended presentations by Allegheny faculty introducing the six courses of this type that they have

developed starting in 2000, lectures by guest speakers, workshops, and discussion modules. Participants were encouraged to gather ideas about Allegheny's neuroscience and humanities courses and formulate specific plans to take back to their schools. These opportunities and experiences resulted in the formation of valuable connections and the development of ideas around the links between neuroscience and humanities.

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It is not easy to break down our culture's traditional barriers between the sciences and the humanities. Not just in academic settings, but all around us, the separation occurs in the ways the natural sciences, social sciences and the humanities are spoken about, the differences in the teaching approach among these disciplines, and the way society perceives and labels those involved with these pursuits. However, faculty at Allegheny College have been working to transcend the stereotypes and merge these supposedly opposing areas of study by creating courses that delve into the connections found between neuroscience and humanities. In this way, faculty strive to link an interest in the humanities (e.g., the fine arts, philosophy and language) with the study of the physical and physiological processes of the body, including the brain and nervous system.

### **BACKGROUND**

The Allegheny faculty, with the help of a grant from the Howard Hughes Medical Institute (HHMI), formed the Neuroscience program in 1996, and by 2000 had begun collaborating with faculty in the humanities departments to create courses that demonstrate and develop the interdisciplinary nature of neuroscience. "When we developed the neuroscience major at Allegheny in 1996, our first goal was to create a strong major that would prepare students well for graduate school and careers in the health professions. Given the large number of neuroscience graduates who have gone on to pursue graduate degrees, we feel that we have been largely successful in this respect," said Lee Coates, Associate Professor of Biology and the Chair of the Neuroscience program.

Coates explained another important aspect of the development of the neuroscience program was to work on weaving different disciplines and areas of study into the program. "A second goal for the neuroscience major was, within a liberal arts context, to reach beyond neuroscience and create links with other disciplines such as music, dance, studio art, communication arts, and language. We

wanted our neuroscience majors to be able to study neuroscience from different perspectives and to appreciate how the brain and nervous system are involved in all human endeavors. In addition, we wanted to make these interdisciplinary neuroscience courses accessible to non-science majors so that these students could also appreciate and understand the role of the brain and nervous system in their fields."

Professor of Psychology Jeff Cross, the former head of Allegheny's Neuroscience program, has been actively involved from the beginning of the neuroscience program with the interdisciplinary options that this field of study promotes. "Neuroscience has arrived at a point where we understand a lot about how the nervous system works, so it seems quite logical to me to explore the links between nervous system operation and complex human behaviors," said Cross. "When you consider the creative processes that generate art, literature, music, dance, science, language, and culture in the context of the nervous system, you are exploring the deepest aspects of humanity. Exploring the connections between the science of the system's operation and the ways we study it and the marvelous output it produces informs both the neuroscientist and the creative process."

The first offering of these interdisciplinary courses was in 2000, in the form of a course entitled Neuroscience of Music Comprehension. In this course, both music and neuroscience students examined perspectives including a traditional music appreciation perspective, a psychological/perceptual perspective, and a neurophysiological perspective. They did so not only by learning about the theoretical and conceptual bases for these perspectives, but also by learning to listen actively to the music, and by taking an active role in experimentation, using themselves as subjects. This concept of doing rather than just observing shows one of the main ways that all of these interdisciplinary courses engage students in the material.

Building on the success of the Neuroscience of Music Comprehension course, Allegheny faculty developed three

additional interdisciplinary courses: Neuroscience of Dance and Movement, Neuroscience and the Visual Arts, History of Neuroscience, and updated the Philosophy course Mind and Brain by adding a laboratory component. (See [webpub.alleg.edu/employee/locates/Neuropage/Keck.html](http://webpub.alleg.edu/employee/locates/Neuropage/Keck.html) for more information including course syllabi). These additions were possible with funding for course development and equipment from the WM Keck Foundation. After the first-time offering of these courses in 2002, additional interest and successes allowed for second (and third for the music class) time offerings this past year. Faculty are in the process of developing a sixth course, Neuroscience of Language, and are planning to offer this in the spring of 2005.



**Figure 1.** During this lab in the Neuroscience of Music Comprehension course, Professor of Psychology Alec Dale shows the brain wave changes during the neural processing of playing a musical instrument using EEG readings from a student wearing an electrode cap.

The neuroscience and humanities courses fit into the Allegheny curriculum in a variety of ways, unique to the students' needs. Currently, the courses are offered under the academic category of liberal studies. Any of these classes can then be applied to requirements for the neuroscience major as electives or to a student's non-major electives. In addition, the course Mind and Brain course can be counted towards a philosophy major or minor. Neuroscience of Dance and Movement can be counted towards the dance studies minor, and these courses also find a place in student designed majors and Minors.

Carla Monzo was a student in the Neuroscience of Dance and Movement the first time the course was offered. In the second offering, she was a teaching assistant for the course. As a dance studies minor, the course fit into her academic curriculum as an elective to her minor. "I think because I was so used to learning dance through a metaphorical perspective and personal subjective experience, sometimes you can feel off track because it's hard to say 'yes the experiences that I'm having is similar to what other people are having,'" Monzo said. "What the

neuroscience brought to that was a common ground to what we were sensing and feeling, because we learned a neuroscience vocabulary and we could find a way to communicate about experiences and understand physically what was going on in our bodies."

Students come to the courses from different academic backgrounds; some come from a neuroscience perspective, others from the humanities. The courses are meant to benefit all of the students, and challenge students to engage in the neuroscience at the level of their understanding. Through the classroom diversity, students from the seemingly opposite ends of the spectrum help each other to feel comfortable. This results in a new area of study: the melding together of neuroscience and the humanities.

"I think the most significant effects I saw were especially watching students when I was a teaching assistant because I could see from the outsiders point of view how people were changing on a day to day basis," said Monzo. "The neuroscience students were coming into their own sense of movement and the dancers were getting a neuroscience background to their movement. It was valuable what they were learning, but more valuable that they were learning in different ways than what they were used to learning."

#### **PURPOSE OF NEUROSCIENCE AND HUMANITIES SUMMER INSTITUTE**

In June 2004 Allegheny College hosted for the second time a Neuroscience and Humanities Summer Institute as a way to share these interests and innovations with a variety of faculty, students, and guest speakers from across the nation. After the success of the first institute in the summer of 2002, the faculty enthusiastically embraced the opportunity to again share ideas on course development, present research, and hold discuss a wide-range of academic interests that straddle the culturally defined boundary between neuroscience and the humanities.

The Neuroscience and Humanities Summer Institute, funded in 2002 and 2004 by the Andrew W. Mellon Foundation and the WM Keck Foundation was designed to be beneficial both for the participants and presenters. For Allegheny faculty it was an opportunity to present on the interdisciplinary courses that have been developed through the neuroscience program since 2000. For other participants, the institute was a place to gather ideas for their own courses and research to take back to their respective institutions. With such a range of academic interests, the institute allowed participants and presenters to begin to speak each other's languages, and as one participant put it, 'steal each other's metaphors.'

During the six days of the institute, the schedule was full of daily lectures, presentations, and discussions. Each day, members of the Allegheny faculty gave presentations on the Neuroscience and Humanities courses that they teach or will be teaching in the future. "The best thing about this Neuroscience Institute was the opportunity to interact with other faculty who were looking for ways or who had discovered ways to integrate neuroscience into

other disciplines,” said Coates. “Of course, on the surface it’s not that hard to make connections between neuroscience and other disciplines, given that everything we do (such as art, music, dance, learning, language) involves the brain and nervous system. However, it’s more difficult to develop coherent courses and laboratory exercises that illustrate the connections between the brain and these other disciplines.”

Coates said he thinks it is a problem that people involved in the sciences often become too focused on a specific discipline or area of research. “The opportunity to develop and teach these types of interdisciplinary courses allows us to extend beyond our discipline, interact with our colleagues in the humanities, and discover new ways of making connections between neuroscience and other fields.”

The Allegheny faculty prepared and led the institute under the direction of Associate Professor of Psychology Jeff Hollerman, head coordinator, and co-coordinators Lauren French, Assistant Professor of Biology and Eric Palmer, Associate Professor of Philosophy. Commenting on what stood out to him about this year’s institute, Hollerman said “a particularly powerful aspect to me this time was the extent to which engaged participation could foster not only curricular, and academic, and professional development, but also personal development. This is closely linked to another striking aspect: how receptive participants were (generally) to exploration of (to them) new areas, perspectives, and activities. Two specific examples were the active engagement of neuroscientists and philosophers (for example) in the dance and movement sessions, and the enthusiasm and determination of a musician examining preserved sheep brain specimens to learn neuroanatomy.” French was also impressed by the contribution of the participants to the Institute. “This was my first time being involved with the institute, but I gather from our organizational meetings that the structure was kept very similar to the first one,” said French, who taught the “Neuroscience of Music Comprehension,” during the Spring of 2004. “The diversity of the participants and their collective enthusiasm was the first thing that struck me about the institute. This continued to impress me all through the week.”

## **PARTICIPANTS, PRESENTATIONS, AND GUEST SPEAKERS**

This year, Allegheny hosted 20 visiting faculty and students from various schools across the U.S., four guest speakers, and 23 faculty members, staff, and students of Allegheny College. Hollerman pointed out that the participants are crucial to the success of the Institute. “They bring an enthusiasm for the topics that I think really helps reinvigorate Allegheny faculty. It is sad to say that we can become a bit ‘jaded,’ treating these courses as ‘just another course,’ when in fact they are extremely uncommon, if not unique,” said Hollerman. “Also, participants bring their own perspectives to the topics we cover, broadening our horizons in that dimension. In addition, some entirely different perspectives and topics can be brought to our attention (the cognitive

psych/literature connection, links to computer science that we have not pursued, etc.).”

Allegheny faculty members gave presentations of the Neuroscience and Humanities courses daily during the institute “with a good mix of information on the course topic and course logistics,” said Hollerman. The faculty used examples of laboratory work done in the courses by students to demonstrate the innovations that are part of developing these courses. For example, Alec Dale, Professor of Psychology, gave a demonstration of the changes in the paraspinal muscular reflex using electrodes and a volunteer student through a concept researched in “the hanging dance” lab. This lab is a part of the Neuroscience of Dance course. Dale also showed the changes in brain waves during the neural processing of music using EEG readings of a student wearing an electrode cap as an example of the kinds of labs used in the Neuroscience and Music course.

Four guest speakers were invited to the institute this year to give presentations on their area of expertise in connection with one of the Neuroscience and Humanities links. Invited presenters were: Owen Flanagan, PhD (James B. Duke Professor of Philosophy, Duke University), who provided insights into the central questions amongst neurophilosophers; Richard Kogan, MD (New York Presbyterian Hospital and Weill Cornell Medical Center), who gave a lecture/performance on the relationship between psychiatric function and creativity in the life and works of George Gershwin; Mark Bodner, PhD (Assistant Professor of Psychiatry and Biobehavioral Sciences at the UCLA School of Medicine and Vice Chairman and President of the Research Division, M.I.N.D Institute), who presented both experimental and model data on music and cognition; and Bill Evans, MFA (Professor, Dance Program, University of New Mexico), who engaged participants in movement explorations centered on the Laban and Bartenieff fundamentals (Figure 2). The backgrounds and specialties of these speakers demonstrated the ways in which neuroscience can reach into an array of fields of study and careers.

Many of the participants responded positively to Bill Evans’ presentation and workshop because of the interactive nature of the teaching. Evans, teaching from a Laban and Bartenieff background (two disciplines of body movement qualitative analysis), encouraged all of the participants to explore neuroscience through dancing and physically moving in ways they had not thought to try. During wrap-up discussions, many people commented that they did not realize what kinds of habits they had formed in their body, but looking at it through a neuroscience and Dance lens allowed these habits to be recognized. On a feedback form, one participant commented, “The dancing/movement activities helped make connections between movement and how we think of moving, and it was great because we weren’t just sitting and listening, we were incorporating everything.” Another participant was surprised at how interesting these humanities connections were, “Because my goal of the week was simply to learn and explore, and because I didn’t plan on pursuing music or dance seriously, those segments really opened my

eyes. I did not realize how strong a link there would be between neuroscience and dance and music.”



**Figure 2.** Faculty and students explore the Laban movement techniques during Allegheny's 2004 Neuroscience and Humanities Summer Institute.

Cross commented that he feels the connection with movement, such as dance, and neuroscience, is a natural one. “Moving through space is something that we learn to do as infants, but when considered from the neuroscientist's perspective, it involves the dynamic interaction of many different physiological systems. Movement in the form of dance involves many of the same systems involved in walking across a room, but also embodies emotional and creative processes that are different from the simple mechanical system operation.”

Many discussions were sparked by this year's group of speakers and Coates commented that the speakers also aided in forming ideas for the next institute. “Dr. Mark Bodner's presentation on music and the brain and misconceptions about the ‘Mozart Effect’ was well received and stimulated very interesting discussions. Therefore, in future institutes, we may try to incorporate more research related topics and discussions into the institute,” Coates said.

Cross said what was the most striking to him about the institute is the effect it has on participants. “Everyone seemed to be enthusiastic and excited about exploring the possibilities of the interdisciplinary experience. Several participants who were from ‘away’ presented the results of their own course development efforts (inspired in part by the first institute), and it was very gratifying to see the success that they had.” One of these participants was John Bienz, an English professor at Mount Union College, who gave a presentation with his colleagues on a course they had developed entitled, “Reality and the Matrix.” This was a course aided by ideas from the first institute, “we began planning during the first Institute and finally brought the course into being this past spring. Our goal was to involve mostly first and second year students in cognitive approaches to literature (narrative and poetry) through our general education program.”

Bienz said it was his interest in cognitive science approaches to imaginative literature that prompted him to attend the first institute, and brought him back for the second. “It seems to me obvious that we can only begin to

know ourselves (that ancient liberal arts mandate is still valuable today) if we begin to understand ourselves as embodied mind/brains. The Institute offers a stimulating place to begin to think about new ways to work this understanding into the humanities curriculum,” he said. Having participants such as Bienz who not only returned to the institute but also with a course developed was very exciting Coates said. “I found it very rewarding that many of the participants from the 2002 Neuroscience Institute chose to come to this year's institute and share with us what they had done at their home institution since 2002. Several had developed courses and told us about their experiences, while some were in the process of developing a neuroscience major or minor,” Coates said.

Jennifer Mundale, Professor of Philosophy, was another participant who had attended the first Institute and returned for the second. As a teacher of philosophy at the University of Central Florida, she found this institute to be in tune with the kinds of teaching that occur at her own school. “Interdisciplinary learning and collaboration are valued by many of the faculty at the University of Central Florida, and it is also encouraged by the higher administration. I am in the Department of Philosophy, which houses not only Philosophy, but also Humanities, Religious Studies, and the new Cognitive Sciences Program, so our organizational structure requires broad, multi-disciplinary cooperation.” The Institute was appealing to her for various reasons. “It interested me because it presented an exciting opportunity for interdisciplinary learning and collaboration, and it did so in an uncommonly intensive way, by being spread over five days. I was eager to have the chance to learn from faculty at other institutions, and to hear how they were managing to bring together neuroscience and humanities in their programs and courses,” said Mundale.

Participants were also encouraged to attend a variety of discussion modules led not only by Allegheny faculty, but also by participants themselves. These modules allowed smaller group discussions around the important themes of the institute and the logistics that go into creating courses like Allegheny's (such as funding sources, creating a successful syllabus, and guiding student research projects). Other modules emerged from other interdisciplinary courses at Allegheny, such as a Goethian philosophy course and a Body in the Western Culture seminar, and from the minds of faculty and participants, such as the discussion of neuroscience and religion.

Another important, although unscripted, portion of the Institute was the informal interaction that took place during meals, breaks, and evening gatherings in the hospitality lounge. “I found the informal interactions between invited faculty, Allegheny faculty and students, and guest speakers to be the most valuable part of the conference,” said Jeremy Teissere, Assistant Professor of Biology at Muhlenberg College. This was Teissere's first time at the institute; a colleague that had visited Allegheny's campus recommended it to him. “By living together and eating together for a week, I felt like the group really created a sense of shared identity. Many people offered course ideas and research ideas with me in these informal



interactions. These conversations often felt like meetings of very different minds all working around common goals of interdisciplinary connection."

Coates also felt the informal interactions were of extreme importance. "The participants from the other institutions, along with the Allegheny faculty and student participants are what made the Neuroscience Institute this year and in 2002 so successful. Among the highest rated activities of the institute were the informal conversations that occurred throughout the week. It was clear from talking to many of the participants that they have a passion for teaching and learning and for finding new ways to explore their disciplines." Teissere is in the process of building a neuroscience program at Muhlenberg. "We felt that neuroscience was a good place to begin fostering these connections," he said. "The institute seemed to be following a unique and nontraditional model quite successfully."

The Institute was also helpful in clarifying to Teissere that the neuroscience and humanities connections are not only about how neuroscience affects the humanities, but also how the humanities have an effect on neuroscience, as seen by the kinds of research going on at Allegheny as a result of these courses. "To my mind, artists and scientists are some of the only people who get to see and discover new truths. This makes some of their goals isomorphic," said Teissere. "I think each field offers the other a rich playground of ideas in which the things common to both fields (investigation, data collection, representation, interpretation) reach new levels of complexity and resonance. Neuroscience can shed light on process in humanities, but the humanities can put the work done in neuroscience in relief and better focus. I feel like a separation of the two seems hopelessly artificial. Putting two sorts of inquiry together feels stimulating and novel, and helps me clarify my ideas in both."

Jan Hyatt, Professor Emeritus of Dance, and former head of Allegheny's dance studies program, has team-taught the Neuroscience of Dance course twice, with Jeff Hollerman and Alec Dale. She said she feels the neuroscience and humanities programs have three significant effects that are proven through the summer Institute. On a personal level, she said working with the Neuroscience of Dance course has taught her the importance of inhibition; by learning the neural processing behind movement, she was able to understand the roles that inhibition has in the body. This was a personal gain from the interdisciplinary approach, she said. Second, having "boundary-less inquiry," she says, is essential because it provides an open canvas to explore ideas on all ends of the spectrum, so that scientists can roam freely into the arts and vice versa. Without the boundaries, questions and answers that were once lost in the borders can be approached. Third, Hyatt said the faculty's ability to model risk-taking is crucial to the success and spreading of these courses. Without faculty who are willing to give in to curiosity regardless if it is beyond their field of study, is an important factor in showing others, faculty and students, how to step outside of their spheres of comfort as well.

Similarly, Monzo commented about the risk-taking aspect of the courses. "The Neuroscience and Humanities courses take people out of their independent departments, and teaches them to see and understand from a different perspective, and find out new things about what other people are studying," she said. "Especially at Allegheny a lot of students to go on graduate school, and I think education can tend to get one tracked. Having undergraduate interdisciplinary studies sets the groundwork for wanting to expand on that in further education." By taking these courses, Monzo said, "you already have a taste of opening up your mind a little and not being afraid to experiment with the ways you think." It is this willingness to explore beyond conventional boundaries and blend disciplines that is at the core of the interdisciplinary links that the Summer Institute encourages.

The planning process is already under way for a 2006 Summer Institute. Some changes that are being considered include extending the length of the program, increasing the number of participants, and further developing the format of the discussion modules. Also, based on the positive responses of participants on the topic, the faculty would like to welcome more students, both from Allegheny and elsewhere, to the Institute. These considerations coincide with the goals of the neuroscience and humanities courses; lengthening the Institute would allow for deeper connections, more participants would increase the exchanges in thoughts that take place, and inviting more students would give a better perspective of those who benefit and experience the courses first hand.

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To learn more about the interdisciplinary neuroscience courses developed at Allegheny College and about the planning for the Neuroscience and Humanities Summer Institute in 2006, see the following web page. This page contains a list of the courses and links to the course syllabi. [webpub.alleg.edu/employee/locates/Neuropage/Keck.html](http://webpub.alleg.edu/employee/locates/Neuropage/Keck.html)

The author is an Allegheny graduate, class of 2004. She was a student in the Neuroscience and Dance class, and attended the Neuroscience and Humanities Summer Institute in June 2004. Her work was supported by funds from the Keck Foundation. Among others, thanks are due to the participants from the Summer Institute who generously provided feedback.

Address correspondence about the Neuroscience program to Lee Coates, Neuroscience Program and Biology Department, 520 North Main St., Meadville, PA 16335 Email: [locates@allegheny.edu](mailto:locates@allegheny.edu) Address correspondence about the Neuroscience and Humanities Summer Institute to Jeff Hollerman, Neuroscience Program and Psychology Department, 520 North Main St., Meadville, PA 16335 Email: [jhollerm@allegheny.edu](mailto:jhollerm@allegheny.edu).