

Site Visit Report
Center for Behavioral Neuroscience
Georgia State University
FY09 September 17-19, 2008

EXECUTIVE SUMMARY

The charge of the site visit team (Team) was to evaluate the accomplishments in year nine of the Center for Behavioral Neuroscience (CBN), a Science and Technology Center (STC) funded by the National Science Foundation (NSF).

The CBN has been a catalyst in establishing the Atlanta area as a premier site for Behavioral Neuroscience research not only nationally but internationally. This legacy of the CBN is matched in importance by the Center's contribution to the dissemination of knowledge about this discipline, and about the practice of science in general, to students and the general public through a variety of innovative activities, often in partnership with community agencies.

The CBN also provides a model for how institutions with very different histories and missions can work together to create a vibrant community of collaborating investigators. This remarkable accomplishment maximizes research productivity and provides the ideal environment for preparing the next generation of scientists to meet the challenges of practicing interdisciplinary science in a diverse society.

The CBN has been successful in meeting the expectations of the NSF's STC program. In addition, due to substantial institutional support and a very talented and effective leadership, the CBN is poised to continue to thrive past the period of NSF direct funding of the Center.

INTRODUCTION

A Team of external reviewers and NSF officials visited the CBN at Georgia State University on September 17-19, 2008. This is the ninth evaluation of the CBN and is associated with oversight prior to its 10th and final year of funding. The Team included the following participants:

External members:

- Dr. Antonio A. Nunez, Michigan State University (Chair)
- Dr. Elizabeth Cropper, Mount Sinai School of Medicine
- Dr. Paul Mermelstein, University of Minnesota
- Dr. Charles Snowdon, University of Wisconsin - Madison
- Dr. Christine Wagner, University at Albany SUNY

NSF members:

- Dr. Martha Flanders, Program Director, IOS/BIO
- Ms. Patricia Page, Staff Associate/ IOS/BIO
- Dr. Randy Phelps, Staff Associate/ OIA
- Mr. Payton Thomas, Program Analyst

The Site Visit Team (the Team) met at Georgia State University (GSU) with the PI and CBN Director Dr. H. Elliott Albers (GSU), Co-Director for Research and Academic Programs Dr. Walter Wilczynski (GSU), Associate Director Dr. Kelly Powell (GSU), and CBN Director of Undergraduate Programs Dr. Karen Falkenberg (EM). Also participating were Dr. Peter R. MacLeish from Morehouse School of Medicine, Dr. Kim Wallen from Emory University, and Dr. Kim Huhman.

Formal presentations were made by Dean Lauren Adamson, Dr. Elliot Albers, Dr. Walter Wilczynski, Dr. Kelly Powell, and Dr. Karen Falkenberg. In addition, the Team had informal discussions with graduate students and postdoctoral fellows.

CENTER ACHIEVEMENTS AND PLANS

RESEARCH

Strengths:

The research programs supported by the CBN are outstanding. The CBN has not only helped develop and promote the work of individual scientists, but has been transformative in shifting the approach that CBN neuroscientists (faculty, post-docs and students) take in collaboration-based research. With core facilities shared across multiple institutions, collaboratories and venture grants, the CBN is a model for future research programs. The legacy of the CBN will undoubtedly be its creation of a successful model for multiple laboratory research.

The approximate 100 faculty that are part of CBN have published over 300 manuscripts per year for the last three years. The CBN has funded over 50 graduate students and 20 postdocs within these labs. In addition, funds from the CBN have generated over \$90 million of additional federal funding since 2003. Findings generated in CBN laboratories over the past decade represent some of the greatest discoveries in the field of behavioral neuroscience. The CBN is nationally and internationally recognized as a hub for exceptional behavioral neuroscience research.

The greatest positive force of the CBN, according to faculty feedback, has been the Venture Grant system. This seed money program helps initiate new directions in collaborative research across labs and across institutions. For the last several years, the CBN has awarded approximately ten proposals per year across participating institutions. This program has been a great asset and has contributed greatly to the high research productivity of the CBN and has helped to garner new external funding.

The successful strategy of collaborative research created by the CBN has fostered a change in research philosophy across multiple participating institutions. One example of this is the recognition by GSU for the Brains and Behavior Program, one of three interdisciplinary programs selected at the institution as strengths worthy of funding for further development. The newly formed Neuroscience Institute at GSU will also follow the legacy of the CBN to foster collaborative research. Additional examples include the generation of animal facilities at two AUC institutions and expansion of Neuroscience research at Morehouse Medical School, which includes multiple investigators with independent, federally-supported research programs. Although not directly funded by the CBN, GSU and GT have entered into a joint

agreement for use of a shared fMRI facility dedicated for research use only. The values of collaboration cultivated by the CBN were deemed essential for the joint project.

Concerns & Recommendations:

A point of concern is the sustainability of the core facilities and the venture grant system following year 10. Fee for service models to maintain the cores seem reasonable, although issues regarding access across universities may become a problem. In addition, there is concern that AUC faculty who may have more limited resources would not be able to afford the fee-based system. A discussion regarding subsidizing those individuals who may need financial assistance appears to be in order.

The continuation of the venture grant system appears to be the most tenuous, as no source for future discretionary funds to run the program has been identified. It is the highlight of the CBN and a lynchpin for its continued success. It is the concern of the Team that several of the participating institutions do not fully appreciate the research success of the CBN and the value of continuing this multi-institutional program. It would be unfortunate if all the participating institutions did not see the value of investing in its future.

EDUCATION

Strengths:

The CBN has added visibility to the graduate programs of the participating institutions. Activities of the center that promote the professional development of graduate students clearly complement traditional disciplinary training and are appreciated by the current cohort of trainees. The CBN also has an excellent record of training postdocs and placing them in academic positions as well as in the private sector. The students and postdocs mentioned the Venture Grant Program as a valuable training tool for developing grant writing skills and for learning how to engage in collaborative research. The annual retreat of CBN graduate students is providing a very effective venue for social and professional interactions across graduate programs and institutions associated with the CBN.

The hiring of two tenure-line science educators by Georgia State University has been a very positive development. The educational activities involving undergraduates and K-12 students have been excellent and have attracted funding from several sources outside the CBN. This has included support from Georgia Bio to develop an undergraduate class on science and business. Further, the initiative to evaluate the effectiveness of different training approaches for undergraduates has produced peer reviewed publications and is currently funded by a 4-year grant from NIGMS. All the educational activities are interconnected and are likely to generate additional extramural support.

Concerns and Recommendations:

Although the quantitative data about the undergraduate programs showed evidence of success in attracting participants, the Team was not able to judge the quality of the undergraduate research experience that was provided. In particular it would have been useful to know if the participants engaged in the design of experiment and in the analysis and

interpretation of the results, and the proportion of the students that were authors of papers or conference presentations.

DIVERSITY AND HUMAN DEVELOPMENT

Strengths:

The Center has done an outstanding job of promoting diversity and supporting human development at all levels of its programs.

Faculty: The faculty are 41% female and 11% targeted minority, slightly above national averages, but there has been greater diversity among the faculty hired as a result of the Center funding. Of those faculty whose hires were supported by the Center, 5 were hired with tenure, 8 have received tenure and 17 are approaching tenure. Only one person has been denied tenure, suggesting that the faculty hired through the Center have been well-mentored and that they find the Center to be an attractive working environment.

Post-Doctoral Trainees: The percentage of female trainees and targeted minorities has been well above national averages.

Graduate Trainees: The proportion of graduate trainees who are female is 87%, well above national averages and the percentage of students who are minorities is at the national average. We note that some of the graduate and postdoctoral trainees have taken faculty positions at the AUC institutions, meaning that their training will continue to play an important role in diversity and human development well into the future.

Undergraduate Trainees. Both the proportion of women and targeted minorities are well above national averages. This is likely due to the close organizational ties established between the Historically Black Colleges and Universities of the Atlanta University Consortium and Georgia State and Emory. The establishment of the summer BRAIN program targeting minority students has also played an important role in this accomplishment.

Institutional: The Center has played an important role in establishing ties between the Atlanta University Consortium and the other partners which, if maintained, can provide an important model for attracting and training the best of all students, leading to a more diverse profession of behavioral neuroscience.

Concerns and Recommendations:

The major concern is how the commitment to diversity can be maintained after the end of the NSF-STC funding. The continuing collaboration of AUC institutions with the Center is important as is the funding for the next few years of the BRAIN program. With 17 faculty hired by the Center still in pre-tenure years careful mentoring will be needed to be sure that each of these hires is able to work to the best of his or her potential so as to have a high probability of being tenured. It will be important to continue efforts to maintain close ties between the graduate training institutions and the HBCU's at all levels- faculty collaborations, graduate training and undergraduate training.

KNOWLEDGE TRANSFER AND OUTREACH

Strengths:

The excellent knowledge transfer and outreach activities have benefited from effective partnerships with Zoo Atlanta, the Atlanta Chapter of the Society for Neuroscience, the Fernbank Museum of Natural History and Georgia Bio, which is a non-profit organization to promote the growth of the life sciences. Already the funding for many of the activities is provided by sources outside the CBN making it likely that they will continue beyond the period of NSF direct support of the CBN. The partnership with Georgia Bio has already produced a very interesting undergraduate course in bioscience-business and promises to be a source of support for future community outreach programs of the CBN.

Concerns and Recommendations:

The Team sees the evaluation of the impact of the community outreach programs as an area that deserves the attention of the CBN. This should be modeled after the excellent evaluation initiatives of the center's educational programs.

PRODUCT DEVELOPMENT**Strengths:**

The Team recognizes the significant accomplishments in the development of research tools by the CBN Shared Facilities. The Team sees the most valuable product of the CBN as the students and postdocs that have been trained in the collaborative, interdisciplinary mission of the CBN and who will bring this "product" to their future institutions.

Concerns and Recommendations:

The Team appreciates that product development is not a major mission of the CBN, but continues to encourage members of the CBN to consider the potential value of tools and techniques generated during NSF-STC funding.

SHARED EXPERIMENTAL FACILITIES**Strengths:**

In the past nine years the four shared core facilities have played a pivotal role in supporting CBN research. For example, the Behavioral Core has developed over 10 software programs for use in CBN and the larger academic community. Additionally, a very exciting new development is the construction of an fMRI imaging facility, which is a joint collaboration between GSU and Georgia Tech. This facility is unusual in that it will be completely devoted to basic science research.

Concerns and Recommendations:

When funding ends it appears that a fee for service policy will be established (at least in some cases). Although this is clearly a practical and necessary outcome of the reduction in

funding, there is some concern that it will limit access for some of the faculty at the smaller institutions.

STRATEGIC PLAN 2009

Strengths:

The Team was pleased to see a clear Strategic Plan in place for the tenth and final year of STC funding. The initial mission of the CBN to develop and expand research, education and outreach has been appropriately shifted to an effort to maintain the most successful and productive programs through year 10 and beyond. The CBN has carefully identified priorities for continued funding including Venture Grants, the BRAIN Program and the maintenance of the Collaboratories. The most successful education and outreach programs will continue in post-STC years with funding secured from foundations, the Atlanta Chapter of the Society for Neuroscience and local educational agencies. The Team commends the CBN for being proactive in obtaining this funding, as these highly successful programs will clearly be part of the CBN legacy. Financial support from Georgia State University for a reduced CBN staff has been promised in perpetuity. The Team was pleased to see that continuous funding for all current students and postdocs has been ensured through this phase-out period.

Concerns and Recommendations:

The Team recognizes that one of the primary concerns for the CBN as it moves into the final year of STC funding is uncertainty about the future. However, it is clear that the leadership of the CBN has proactively and thoughtfully pursued numerous options to ensure that the most successful aspects of CBN continue. The Team was disappointed to learn that efforts to secure institutional support from Emory University have not yet been fruitful, particularly in light of the many benefits that Emory has received from the CBN.

RATIONALE AND VALUE ADDED

Strengths:

The CBN has proven to be a highly successful model of "Team Science". Highly productive collaboratories have been established that encompass over 175 faculty postdocs and students. A number of research projects developed in the collaboratory setting are both interdisciplinary and inter-institutional, and have made a unique contribution to behavioral neuroscience. The CBN's deep seeded commitment to knowledge transfer is also evidenced by their considerable success in the development of faculty that are both scientists and educators. The latter will be a part of the legacy of this center and will undoubtedly have a widespread impact on strategies for faculty development throughout the Neuroscience community.

Concerns and Recommendations:

A suggestion from the previous year was that the CBN highlight the added-value aspect of the CBN to secure post-NSF funding from other sources. Although this effort has clearly been successful in some cases some concerns remain, e.g., with respect to support from Emory University.

INSTITUTIONAL SUPPORT

Commitment from Lead Institution:

Georgia State University has made major commitments to the CBN through providing space and supporting eleven faculty hires in behavioral neuroscience. Georgia State has provided space for the administration of the Center and is in the process of constructing a new science building with several floors devoted to behavioral neuroscience. A new Neuroscience Institute has been established with the co-director for Academic and Research programs slated to become the new director. A Ph.D. program in Neurosciences has recently received unanimous faculty approval and is awaiting final approval by the Board of Regents. The University has also made a strong commitment to the future of the Center through committing funds equivalent to 50% of the administrative budget in perpetuity. This is an extraordinary commitment to insure the continuation of the Center after the end of NSF-STC funding.

Commitment from Other Institutions:

Emory University has received major benefits from the Center in terms 12 new hires with appropriate start-up funding and Emory Faculty have been the lead members of 4 of the 5 collaboratories that have formed the Research Core of the Center. As noted in the previous report continued support and involvement from Emory will be critical in determining the success of the Center beyond the NSF-STC support period. Although the Emory faculty associated with the Center appear enthusiastic about the long term maintenance of the collaboration with faculty from other institutions there appeared to be little if any possibility of formal commitment from Emory toward sustaining the Center beyond the last NSF-STC funding year. Since Emory has significantly benefited from the Center, it is disappointing that the institution has not yet been willing to support the commitment of their faculty. One of the successes of this Center has been the ability for faculty and students to transcend institutional boundaries, but this will only continue with the support of all partnering institutions.

The institutions of the Atlanta University have seen a total of 9 new hires and they have each collaborated with the Center to build or renovate facilities for the new faculty hires. It was unclear how each of these institutions would continue support of the Center beyond the end of the NSF-STC grant, but close intellectual ties established with Morehouse Medical School and with several of the new faculty, some of whom have been CBN students or post-docs are likely to remain.

The Center has established ties with Georgia Tech and a new shared human imaging facility between Georgia State and Georgia Tech will maintain intellectual ties between these institutions.

Commitment to Continue to Support Students:

One initial concern had been what would happen to current graduate students and postdocs after the end of NSF-STC funding. The Committee was reassured that funding for continued support of all students will be sustained through faculty or institutional resources.

OTHER SECTOR SUPPORT

Strengths:

The administrative heads of the CBN have pursued additional sources of funding for the continued success of the program. They have identified diverse funding sources that include the state and federal government, internal institutional funds, corporate support, and private foundations. Examples include the future resubmission of an IGERT fellowship application to fund post-doctoral fellows, a federal government earmark, discussions with the Georgia state government, and applications to private foundations to fund CBN graduate students.

The Georgia Research Alliance (GRA) has been identified to manage funds obtained by private sources to provide equity across institutions. The GRA has previously provided significant resources for equipment and laboratory renovation.

The Atlanta chapter of SfN will provide the funds and organization for many of the educational programs initiated by the CBN. Continued success of these programs appears highly likely.

New for this year, the CBN is working with Georgia Bio, a consortium of biotechnology corporations in asking the Georgia government for a 200 million dollar investment in basic neuroscience research in Atlanta. Several CBN faculty will be presenting their research to the public at an upcoming summit meeting. In addition, GSU will begin this year to provide salary support for CBN faculty and staff in perpetuity.

Concerns and Recommendations:

No potential source for discretionary funds to continue the Venture grant program has been identified. Without venture funding support, it is unclear whether the CBN will continue to be as successful as it has been in the past. It may be possible that monies from the Georgia state government, through interactions with Georgia Bio, may be used for this purpose, but obtaining those funds in the near future appears unlikely. One additional concern is the lack of continued institutional support from Emory University in future years.

BUDGET

The leadership of the CBN has made judicious budgetary decisions to continue the core activities of the center, including the Venture Grant Program, during the last year of NSF/STC support. The Team appreciates the energetic efforts of the CBN to secure funding from the public and private sectors to supplement NSF support of innovative educational and community outreach activities. Also commendable is the plan to provide uninterrupted financial support for graduate students and post-docs for their tenure as CBN scholars.