NIH-Conte Center Report Summary - 2004

In the enclosed progress reports we describe the progress so far – after the first 8 months after starting the project – quite a bit less than 1 year. The initial ramp-up was slow (this is typical): in particular, the funding of our subcontracts to CalTech and Northwestern took an especially long time and was not in place until the beginning of 2004.

As planned, MIT functions as home site for the overall effort. Our Conte Center Web site is up and running at <u>http://cbcl.mit.edu/cbcl/projects/nih-conte/index.html</u>. Most of the information about publications, people involved in the project at the different Institutions as well as past and future meetings and workshop is available there online. Feedback from NIH to improve the site and its usefulness to NIH would be highly appreciated!

Significance:

Since the seminal work of Gross and others about 35 years ago, considerable progress has been made, especially in the last decade, towards characterizing the neural correlates of recognition and categorization in cortex. We view the separation between the physiology and the modeling work as one of the main limitations of the present, correlational approach. We believe that modeling can be a useful tool, complementary to physiology, for going beyond correlational studies and for unraveling such a computationally difficult problem; at the same time, theories without a close interactions with experiments are likely to be irrelevant. As a consequence of this belief, the distinguishing feature of our MIT project is the strong coupling between the planned computational and experimental work on visual recognition. This is also the reason for a multidisciplinary approach within this project in which a computational group interacts closely with physiology groups. We hope that NIMH will regard our Center as an experiment for testing the "meta" hypothesis -- relevant to several programs at NIH -- that computational models can be powerful tools to understand complex brain functions and to drive synergetic interactions between different labs. Computational tools and theories are having a similar effect in genomics. Our meta-goal is to show that quantitative models of complex neural system, when developed in close cooperation with experimental labs, can be tools to a) think about the problems (some cognitive problems are too complex for the qualitative, simple models used so far); b) make predictions, suggest and plan new experiments; c) analyze and interpret data; d) integrate experimental findings of different types and from different labs, drawing implications for future experiments from multiple sources of evidence.

Plans:

We plan to have inter-Institutions exchanges of students. For instance, Ulf Knoblich will spend part of the summer at CalTech to pursue one of the new aims, and in particular simulating in a more biophysically detailed way circuits for tuning and softmax. Later we hope that this project will drive experiments at Northwestern.

We plan to hold a meeting of the Conte Center on August 30th and 31st, 11 months after the official starting date. We already have in place an outside Board which will review in 2004 our activities from the beginning of the project. The advisory committee is composed of Drs. B. Desimone (NIMH), L. Abbott (Brandeis) and M. Livingstone (Harvard Medical). A preliminary agenda is available at our Web site under the URL http://cbcl.mit.edu/cbcl/projects/nih-conte/Meeting_Agenda_2004.pdf.

This will be the third meeting of our group since we started putting the proposal together, but the first official one as a Conte Center and the first one with an advisory committee. As the previous two meetings, it will take place in the building of the American Academy of Arts and Sciences in Cambridge. The main function of the meeting will be to get together the groups from MIT, CalTech and Northwestern.