Continued from page 1

28 projects for $2.5 million as well as an additional $500,000 for the collaborative "Baby Sibs" project (see article "The 'Baby Sibs' Project: NAAR Funds Innovative Collaboration of Researchers"), and up to $300,000 for a series of scientific conferences and working groups. The research will be conducted in medical schools and institutions throughout the United States as well as in Canada, Denmark, England, Ireland, Israel, and Italy. NAAR has now committed a total of over ***$6 million*** in just five years to more than 80 research projects conducted in 55 universities and medical institutions throughout the U.S. and seven other countries! More than 40 scientific articles have been published citing NAAR funding support and we receive news of more of such articles every month as increasing numbers of NAAR-funded scientists complete their research and publish their findings. (See the listing of articles on www.naar.org and the Spring 2001 *NAARRATIVE* reporting on the research of Dr. Chris Stodgell and Dr. Flavio Keller.)

Drs. McIntosh and Winkielman

Clearly, as the number of research projects funded by NAAR grows each year, it becomes more formidable to communicate effectively the meaning and goals of each project. However, I hope that this article provides enough information on each project to convey its aim and the reason why such research is relevant. For me and, I believe, the vast majority of NAAR volunteers and supporters, the announcement of the winning NAAR Research Awards is a highlight of the year. I hope that, in reading about the NAAR Research Awards for this year, you'll share my enthusiasm and will continue to work with us to fund the crucial research that will ultimately yield effective treatments, prevention and cures.

The Social Sphere

In the past few years, NAAR has funded some of the most exciting work exploring the biological basis of the social deficits in autism spectrum disorders. Social skills as a phenomenon are poorly understood by neuroscientists. It would seem intuitive that social skills are just the combination of a huge number of independent neuronal circuits and that as people grow and develop we are usually able to put it all in place to handle our social environment. There is now some substantial evidence that there are specific biologic systems for "social skills" and, in fact, there may even be some single proteins responsible for social skills. NAAR is pleased to be funding the groundbreaking work of Dr. Larry Young and his colleagues at Emory University, and several fascinating projects at the Yale Child Study Center.

Last year, Drs. Ami Klin, Fred Volkmar and their colleagues at Yale were funded to study what individuals with autism and "controls" paid attention to in social situations. They have recently reported that individuals with autism pay far less attention to faces than do control subjects. Instead, they focus a much higher percentage of the time on the lower part of the face--that is, the mouth area. In addition, individuals with autism focus on the mouth of the person speaking and pay very little attention to the face of the listener. In contrast, the control group spent significant time looking at the speaker's eyes and also at the nonspeaking person, i.e. the listener. Clearly, a great deal of social information can be derived from the face and, particularly, the eyes of the listener. In order to understand this further, Dr. Robert Schultz and others at Yale also studied brain scans of these two groups while they were looking at faces. Incredibly, they found that an area of the brain thought to "specialize" in face processing is not engaged when individuals with autism do the very same task; rather, individuals with autism process faces using the area of the brain which typically processes *objects.*

These findings raise very interesting questions such as: is this a biological problem "genetically built in" from birth or somehow is it developed by individuals with autism by not "practicing" the study of faces? In order to study this question, NAAR is funding Drs. Ami Klin at Yale and Jocelyne Bachevalier at the University of Texas-Houston to study this phenomenon in an animal model using monkeys ***("Visual Pursuit in Non-Human Primates with Mesiofrontal-Limbic Lesions Previously Shown to Offer a Successful Animal Model of Autism").***

Continued on page 24

Continued from page 23

Monkeys are used since they share the human behavior of examining faces as part of successful social functioning. (In contrast, lower level primates, such as rats, use their sense of smell preferentially.) Novel eye tracking devices, analogous to that used by the Yale researchers in their research with children, will be constructed for the monkeys. From this research, we hope to learn much more about the “neurology” of social face recognition and, thereby, whether there is a basic developmental abnormality that may be at the root of autism's characteristic social deficits.

In a second NAAR-funded study, *"Core Affective Processes in Autism"*, a research group from the University of Denver led by Drs. McIntosh and Winkielman also seeks to understand the underlying biological problems which may contribute to autism's social deficits. Social skills are extremely complex and are very much intertwined with verbal abilities. The existing literature on social skills in autism is performance-based--that is, measuring what the individual can and cannot do. We know, however, that the brain is able to circumvent brain problems and enlist existing circuits to master new skills. This is known from the medical literature on stroke patients and, in fact, is the basis for our ability to learn a second language. The above mentioned Yale Child Study Center's facial recognition project also suggests that alternative neuronal mechanisms are used by individuals with autism rather than the special brain center typically used.

In the case of social skills, little is known about the fundamental brain circuits that are typically used. In order to determine if there are very basic differences in the way emotional issues are processed in individuals with autism, Drs. McIntosh and Winkielman propose to use physiologic testing to monitor the emotional responses of individuals with autism versus controls. For example, if an emotional scene is shown to someone, there is an immediate autonomic response. This can be measured by electrophysiologic techniques. When humans see a stimulus, such as an angry or a smiling face, it is the natural reaction to mirror that expression with a very slight facial movement. When one sees a smiling face, for example, it is natural to pull one's cheek muscle up and back within about 300-400 thousandths of a second. The time of response is a very important measure. The natural pathways tend to be much quicker than acquired, compensatory ones. By studying a series of these responses, these scientists hope to learn which are the most basic neurological deficits involved in emotional processing. Early interventions might then be targeted at these impairments and improve our ability to treat children with autism effectively.

Language and Communications Research

Very closely related to social skills is language and communications. For the past two years, NAAR has made a special call for research proposals in this area. We believe that this is an area of research crucial to understanding autism and one that has been historically overlooked. Language and communications skills are difficult to study. The neurology is very complex and animal models of language are very difficult to interpret. The seven NAAR-funded projects in the area of language and communications research therefore encompass many different disciplines and approaches.

A significant percentage of children with autism fail to develop language normally and it is not known why this occurs. One obvious problem could be in the brain's auditory systems. However, little is known concerning the auditory processing abilities of individuals with autism. Many autistic children, especially those with significant communication impairments, cannot comply with the behavioral requirements of traditional audiological evaluations. Drs. Dana Boatman and Barry Gordon of Johns Hopkins School of Medicine have received NAAR funding to develop an auditory assessment protocol ***("Evaluation of Auditory Processing in Low Functioning Children with Autism")***. This will be designed specifically for the child with significant communication impairment. They hope to be able to create a test battery that can answer the following questions: Does my child hear normally? Does my child have difficulty processing sound after it is heard? Is my child experiencing auditory processing difficulties which could be contributing to a more general communications disorder?

In another 2001 funded project which explores the auditory system in autism, Dr. Timothy Roberts of the University of California, San Francisco will continue his NAAR-funded research on sound processing in the brains of individuals with autism ***("Neural Correlates of Phonological Processing in Autism")***. Dr. Roberts uses magnetoencephalography or "MEG", which is similar to an EEG. MEG measures

Continued on page 25