

# InsideSARGENT

Boston University College of Health & Rehabilitation Sciences: Sargent College

## ACCOMPLISHMENTS IN **SPEECH, LANGUAGE & HEARING SCIENCES**

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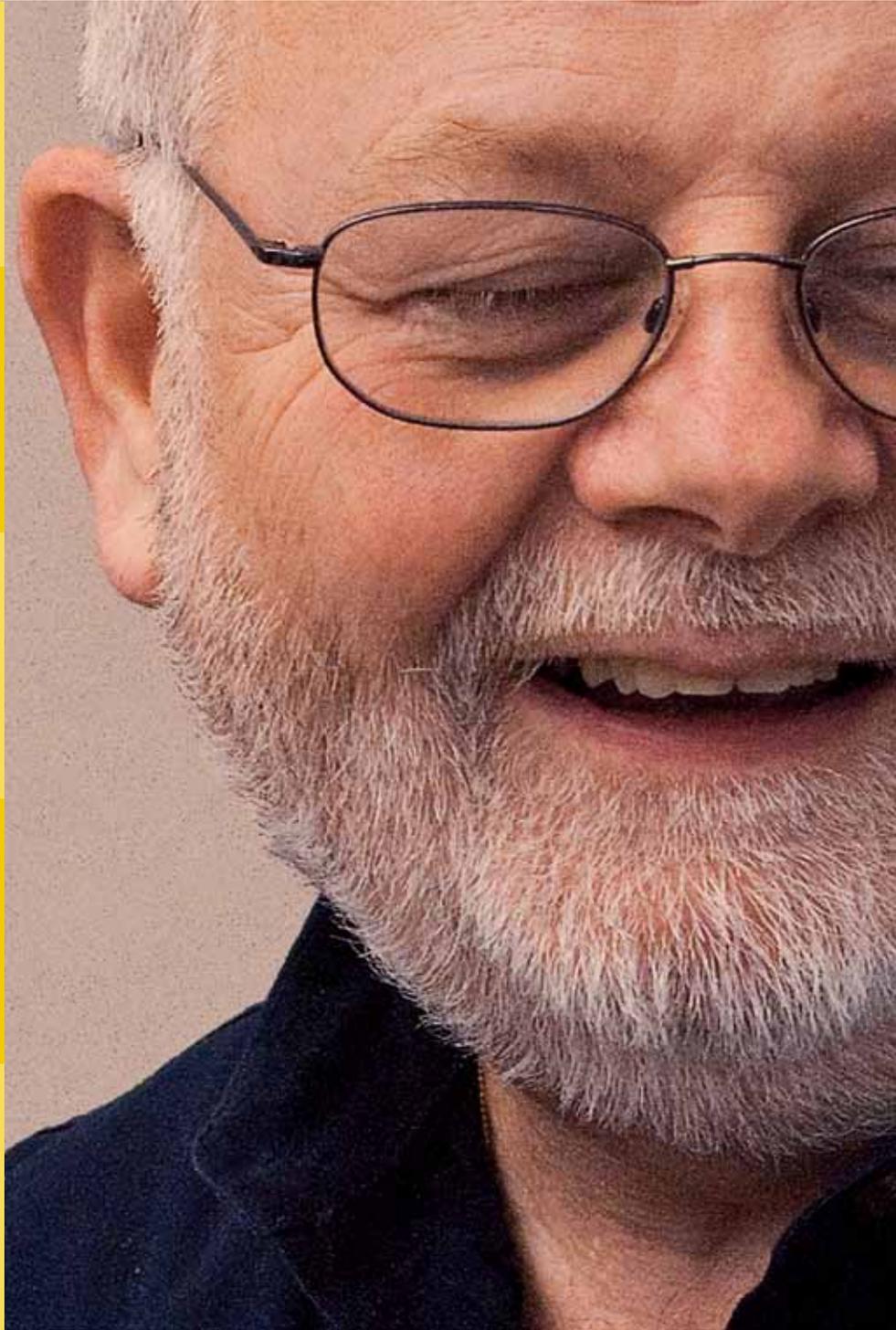
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**Dear Friends,**

On behalf of the faculty in the Department of Speech, Language & Hearing Sciences in the College of Health & Rehabilitation Sciences: Sargent College, I am pleased to introduce this special edition of *Inside Sargent*, which highlights the exciting work we're doing to bridge the lab and practice settings.

Well known for its medical facilities and proximity to numerous outstanding health centers, Boston offers a variety of clinical placements, research opportunities, and the chance to work alongside outstanding colleagues. Kristine Strand's long association with the learning disabilities diagnostic team at Children's Hospital Boston is a good example of

the way that academic faculty collaborate with area clinicians. In this issue, you will also see how Susan Langmore's research and clinical expertise have come together to improve the treatment of dysphagia in people with head and neck cancer. By working in the community, our faculty can bring their insights and most compelling cases to the classroom, using real-life examples to inspire and educate students.

Interdisciplinary research is a top priority at Boston University. Gerald Kidd works with colleagues in the BU Biomedical Engineering and Cognitive & Neural Systems departments to expand his research in psychoacoustics, binaural hearing, and auditory perception. Frank Guenther recently joined our department; his research in the area of neural prostheses for speech production is especially impressive. The collaboration between the research and clinical arms of our Aphasia Resource Center allows students to see the full continuum of current treatments for aphasia; each semester, the center treats more than 50 people with aphasia, offering a unique educational experience to our students and providing a valuable community service.

While Boston is a relatively small city, it shares many of the issues that challenge larger population centers. We are strongly committed to helping our neighbors: literacy groups in Boston's public schools offer an intense, rewarding experience for students interested in school-age language; students conduct hearing screenings for children across the city; and Elizabeth Gavett is coordinating a project with the Museum of Science to address the needs of children with autism spectrum disorders.

Our impact also stretches far beyond our city. Diane Parris spent a month at the Michael Palin Centre for Stammering Children in London, England, as part of her ongoing collaboration with the Stuttering Foundation of America (SFA) and also hosts regular SFA workshops at BU that bring together experts in the area of fluency disorders. Parris is a member of the American Speech Language and Hearing Association Specialty Board on Fluency Disorders.

The work of speech-language pathologists and audiologists is crucial to improving the quality of daily life for people everywhere. We are proud to have a Council on Academic Accreditation in Audiology and Speech-Language Pathology-recognized program and to participate in the American Speech-Language-Hearing Association. We are also honored to have faculty members serving as associate editors for the *Journal of Speech, Language, and Hearing Research*.

The speech, language, and hearing science professions offer exciting clinical, research, and teaching opportunities. At BU Sargent College, we blur the boundaries across these areas with the goals of achieving a deeper understanding of communication disorders, improving access to services, and providing an inspiring education for our students.

With warm regards,

Melanie L. Matthies  
Department Chair, Associate Dean, and Associate Professor

"BY WORKING IN THE COMMUNITY, OUR FACULTY CAN BRING THEIR INSIGHTS AND MOST COMPELLING CASES TO THE CLASSROOM, USING REAL-LIFE EXAMPLES TO INSPIRE AND EDUCATE STUDENTS."

SPECIAL EDITION **InsideSARGENT**

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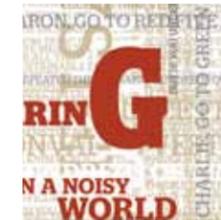
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Accomplishments in Speech, Language & Hearing Sciences

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Bilingual Breakthrough



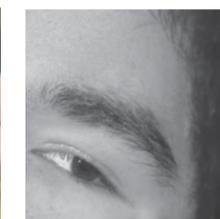
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WHY ARE NOISY ROOMS SO  
CONFOUNDING FOR PEOPLE  
WITH HEARING LOSS, AND WHAT  
CAN BE DONE TO HELP THEM  
MAKE SENSE OF THE DIN?

By Corinne Steinbrenner

# HEARING IN A NOISY WORLD



If you're among the 38 million Americans with some form of hearing loss, you know the scenario all too well: You have no problem listening to a friend when you're talking one-on-one in a quiet room, but move that same conversation to a busy restaurant or a lively party, and suddenly you can't follow a word your friend is saying. You may even be among the many who find noisy situations so frustrating that you avoid social gatherings altogether.

The difficulty people with hearing loss can have in noisy environments is sometimes called “the cocktail party problem.” It's the problem Professor Gerald Kidd is trying to solve.

A specialist in psychoacoustics (the study of the perception of sound), Kidd aims to understand why people with hearing impairments have so much more difficulty in complex listening environments than other people and, ultimately, what can be done to help them. It's a tricky problem to study, Kidd says, because focusing on a specific voice in a noisy room is a complicated task that humans accomplish using a wide variety of cues, from the sound of the voice and the location of the speaker to the meaning and context of the speaker's words.

To understand what happens in human ears—and brains—in these complex situations, Kidd and his research associates design experiments to isolate and study specific components of the listening task. Kidd conducts much of his research in the Sound Field Laboratory at BU Sargent College and invited me to visit so I could experience a typical experiment firsthand: How would I fare when confronted with the cocktail party problem?

I step into a large booth and sit in a chair facing an array of five loudspeakers. A staff member at the lab tells me to listen for the instructions that begin with my call sign, “Baron.”

During the first round of the experiment, I hear three similar-sounding female voices all coming simultaneously from the middle loudspeaker. The voice I'm trying to listen to says, “Baron, go to red five now.” At the same time, a second voice says, “Eagle, go to blue three now,” and a third voice says, “Charlie, go to green seven now.” I tentatively press the “red” button and then the “five” button on my handheld device, not entirely sure I've got it right. The situation repeats several times with different color and number commands and with the target and competing voices set at different volumes. Sometimes I can decipher the target voice; sometimes the other voices drown it out and I just guess at which buttons to push.

During the second round, the experiment is the same except that, this time, the sounds are spatially separated: The target voice comes from the loudspeaker directly in front of me, while the competing voices come from speakers off to my right and left. This round is easier. Now that I can focus on a specific loudspeaker, I can pick out the target voice much more often.

When researchers in his lab originally conducted this experiment, Kidd explains, they repeated this scenario hundreds of times with research subjects of normal hearing ability and with subjects with hearing loss—with and without their

hearing aids. The researchers varied the distance between the loudspeakers and the acoustic conditions of the booth, adding Plexiglas panels to the walls to create reverberations. The study was designed to help Kidd and his colleagues better understand how our ability to untangle a jumble of sounds is affected by the distance between the sound sources. Among the things they found, Kidd says, is that people with hearing impairments benefit much less from spatially separating the sounds than people with normal hearing do.

Spatial separation is just one piece of the hearing puzzle Kidd has explored. In study after study, he has experimented with the pitch, timing, speed, intelligibility, and other aspects of sounds, gradually building his understanding of the many components involved in hearing in noisy environments—and how that complex process breaks down for people with hearing impairments.

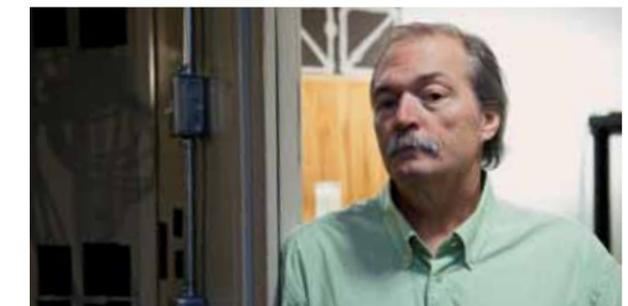
Barbara Shinn-Cunningham, director of graduate and undergraduate studies at BU's Department of Cognitive & Neural Systems [now codirector of the Center for Computational Neuroscience & Neural Technology], says Kidd's work is critical for engineers trying to build better hearing aids. Today's hearing aids, she says, don't help much in noisy environments. “If you understood what the brain needs in order to separate sounds,” she says, “you could do things like build a smart hearing aid that preprocessed sound,” sending only the most important sounds along to the brain and thereby easing the burden on the brain.

Such sophisticated hearing aids are still in the “science fiction phase,” says Kidd, because—as his research constantly reveals—the process humans go through to selectively attend to one sound while ignoring a cacophony of others is difficult to understand, let alone to duplicate.

“It's all very complex,” Kidd says. “Every time you think you know something, there's an asterisk, and there are two other questions you feel you need to answer.”

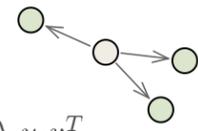
“When you have the brain involved, you shouldn't expect that the answers are going to be simple and easy. They're going to be very complicated. That's why you have to study them as carefully as you can.”

*This article was originally published in the 2010–2011 edition of BU Sargent College's annual publication Inside Sargent.*



“IT'S ALL VERY COMPLEX. EVERY TIME YOU THINK YOU KNOW SOMETHING, THERE'S AN ASTERISK, AND THERE ARE TWO OTHER QUESTIONS YOU FEEL YOU NEED TO ANSWER.” GERALD KIDD

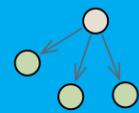
# Encoding the Brain

$$A = \sum_{i=1}^N \lambda_i u_i v_i^T$$


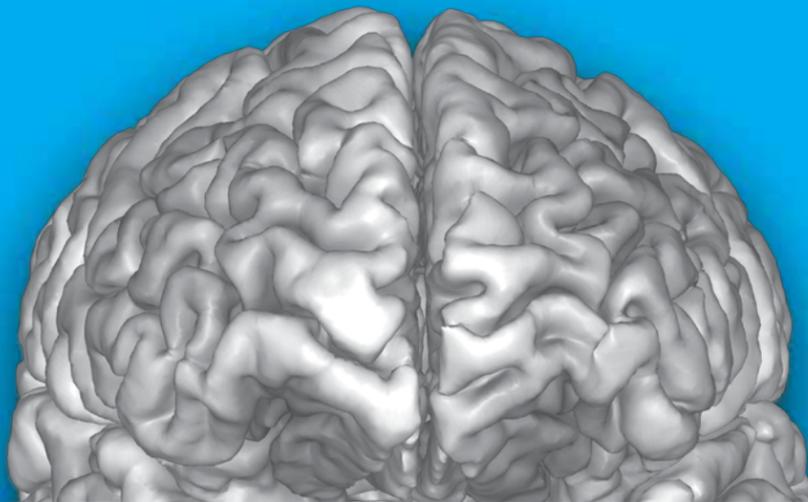
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A NEUROSCIENTIST IS MAPPING THE RELATIONSHIP BETWEEN GENES AND BEHAVIOR TO UNDERSTAND HOW THE BRAIN WORKS—OR DOESN'T—IN PEOPLE WITH DEVELOPMENTAL DISORDERS.



By Tricia Brick



Before he was a neuroscientist, Jason Bohland built artificial brains. While studying for his master's degree in electrical engineering, he designed computer models that simulated the encoding and storage of memories. "I was working with simple units meant to mimic neurons," he says, "and looking at how the connections among them can affect the capacity of memories, and how the dynamics of that artificial system unfold over time."

Bohland (GRS'07), an assistant professor in BU Sargent College's departments of Health Sciences and Speech, Language & Hearing Sciences, has since turned his attention to real brains and now is researching the role of genetics in certain deficits associated with developmental disorders. Why does delayed spoken language affect only half of people diagnosed with autism spectrum disorder? What are the underlying relationships among genetics, brain architecture, and behavior? Answering such questions could eventually lead to the generation of improved diagnostic and therapeutic tools.

Yet Bohland has not entirely left his early engineering work behind. He is still looking at the structure and dynamics of whole systems, using computer analysis to explore how the elements of the brain work together. He says, "My engineering experience allows me to look at the system we're studying and ask, 'How is it put together? If I were to build a system to do the things a brain has to do, how would I go about doing it?'"

Bohland is part of a multidisciplinary vanguard in neuroscience that combines the holistic perspective of systems biology

< Jason Bohland's study of brain images could improve our understanding of conditions affecting speech and language. The scan shown is of Bohland's own brain.

with new computational capabilities—in this case, the analysis of huge data sets, involving terabytes of information—to revisit long-standing questions about the brain. "Historically, because of technological limitations, researchers have generally spent their careers working on one part of the brain, using a set of techniques of their choice, which may or may not be the same set of techniques another lab uses in another part of the brain," Bohland says. "While it has led to a lot of great insights, we're left without many big-picture ideas about neuroscience."

But technological advances in the last decade have exponentially increased the capacity to store, analyze, and share data, opening a new front in the quest to understand the workings of the brain. At Seattle's Allen Institute for Brain Science, for example, scientists have built a standardized atlas of gene expression for the entire mouse brain and are finishing work on a similar atlas of the human brain. Both atlases are available online to any researchers interested in working with the data.

Bohland worked with the mouse data as a postdoctoral fellow and scientific informatics manager at Cold Spring Harbor Laboratory, Cold Spring Harbor, New York, an elite institute for the study of molecular biology and genetics. Now, at Sargent College, he plans to use the forthcoming human brain data for a project that he hopes will shed light on the genetic components of certain heritable disorders affecting speech and language, and to begin to account for the wide range of behavioral variability in individuals with these disorders.

"MY ENGINEERING EXPERIENCE ALLOWS ME TO LOOK AT THE SYSTEM WE'RE STUDYING AND ASK, 'HOW IS IT PUT TOGETHER? IF I WERE TO BUILD A SYSTEM TO DO THE THINGS A BRAIN HAS TO DO, HOW WOULD I GO ABOUT DOING IT?'"

JASON BOHLAND



The study will engage healthy adults and children in tasks selected to highlight certain behaviors that are impaired in people with autism, specific language impairment, and other conditions that affect speech and language. With fMRI (functional Magnetic Resonance Imaging), he will localize the brain areas that are activated, and the functional interactions between these areas, as the subjects carry out their tasks. Then, using advanced computational techniques, he will compare his findings to the Allen Institute data to identify genes or sets of genes that tend to be highly expressed in those brain systems. "This provides a way to bridge the genotype-phenotype gap: We can get from the genes to the systems they're expressed in, and we can get from behavioral outcome to the parts of the brain associated with that behavior," Bohland says.

As with much systems-biology research, this work is data-driven rather than hypothesis-driven. But Bohland describes his work as a "hypothesis generator": He hopes his study of healthy subjects will help him formulate theories about the mechanisms of such disorders as autism, dyslexia, and stuttering. "Jay's research has the potential to provide new insights into the neurocomputational underpinnings of a large number of genetic disorders," says Professor Frank Guenther of the Departments of Speech, Language & Hearing Sciences and Cognitive & Neural Systems. "This knowledge will be valuable in guiding pharmacological as well as behavioral treatments for these disorders."

Bohland intends for the tools and methods he develops to be available for use by other researchers so that they may use them to develop and test their own hypotheses. A planned online portal will provide access to his imaging results and other resources. "More and more people are adopting the spirit of 'We're all in this together,'" he says. "In terms of science, that spirit of sharing data and tools is a huge component of what I believe in."

*This article was originally published in the 2010–2011 edition of Inside Sargent.*

# BILINGUAL BREAKTHROUGH

HELPING BILINGUAL STROKE PATIENTS TO COMMUNICATE AGAIN MEANS SKIPPING THE SIMPLE LESSONS AND STARTING WITH THE COMPLEX ONES.

By Tricia Brick

In Swathi Kiran's lab during the summer of 2009, ten people learned to speak again—in two languages. In her Aphasia Research Lab, Kiran, an associate professor in the Department of Speech, Language & Hearing Sciences and a licensed speech language pathologist, is working to develop treatment programs for bilingual patients who have aphasia caused by stroke.

Aphasia is the loss of language—an impaired ability to understand or produce words or sentences. Among the approximately 20 percent of stroke victims afflicted with aphasia, some have difficulty in reading or writing, others in finding the words to identify objects or ideas, and others in putting sentences together; some will lose the ability to understand language entirely.

Though no single agreed-upon treatment program currently exists for aphasia, therapy for the disorder has traditionally paralleled the progression of normal language learning: patients are retaught language beginning with simple words and concepts and progressing through levels of increasing complexity. But Kiran has found that aphasic patients progress most efficiently when their course of treatment begins with more complex concepts.

In retaught an aphasic patient the words for various foods, for example, rather than begin with the simplest, or most typical, examples—carrot, cucumber—Kiran introduces the words for less-obvious items within the category, such as parsley and pumpkin. Patients taught in this way improve not only in identifying the foods whose names they relearn, but also in naming more-typical ones that are not taught, the carrots and cucumbers.

A FLUENT SPEAKER OF HINDI, TELUGU, TAMIL, AND ENGLISH, WITH KNOWLEDGE OF SPANISH, SWATHI KIRAN HAS LONG BEEN INTERESTED IN THE TREATMENT OF APHASIA AMONG BILINGUALS. "BECAUSE I'M MULTILINGUAL, I KNEW THE LANGUAGES WERE INTERCONNECTED. AFTER ALL, I'M DOING ALL OF THESE THINGS WITH ONE BRAIN."

Starting with more difficult tasks may seem counterintuitive, but Kiran explains that aphasic patients—who once were fluent in the language or languages they are being taught—are in a very different situation from people learning a language for the first time. "Following the stroke, these individuals have lost access to certain aspects of their brain—to certain networks of information," she says. "But it doesn't make sense to treat them like blank slates, to teach them as though they're little kids learning a new language. At a fundamental level, we're suggesting that you're not reteaching language, you're assisting in reorganization."

Kiran is extending her research to aphasic patients who were English-Spanish bilingual before their strokes. In the United States, bilingual aphasia patients are frequently treated in English, regardless of their pre-stroke fluency, simply because the available clinicians tend to speak English. Kiran's work seeks to answer the question: Is this the best way to help these patients relearn language?

Ricardo was born into a Spanish-speaking household in Texas near the Mexican border, and grew up speaking both English and Spanish fluently. He married a woman who spoke



Swathi Kiran's research is giving bilingual stroke victims new paths to recovery.

no Spanish, and though he occasionally spoke Spanish with his mother and in his job as a land surveyor, English was his primary language throughout his adult life.

Then, in his mid-fifties, Ricardo suffered a massive stroke. Among the several deficits he suffered in the wake of the event was aphasia: the formerly bilingual Ricardo had lost the ability to speak in either of his languages.

Ricardo was selected by Kiran to participate in a clinical study on aphasia in post-stroke bilingual patients. She began his therapy in English, his stronger language, and over time, he slowly began to learn the words he was taught. But he did not improve in Spanish at all. "When we realized he wasn't improving in Spanish, we switched to providing therapy in Spanish instead of English," Kiran recalls. "And we found that as he improved in Spanish, he also improved in English—in fact, he improved more than he had during the English treatment."

The parallel to Kiran's previous semantic-complexity research was clear: The more difficult work, learning in the weaker language, proved to facilitate relearning in the stronger language.

Kiran is continuing her work with Spanish-English and other bilingual patients to find out whether Ricardo's experience will be reproducible across a broader population. In addition to a systematic clinical study in which she and her colleagues provide therapy in each patient's weaker language, she plans to use fMRI (functional Magnetic Resonance Imaging) as a tool to examine her patients as they recover to better understand which parts of the brain they are using as they relearn language.

To extend the reach of her research, Kiran is also working with a colleague at the University of Texas at Austin to develop a computer model that simulates a bilingual person learning two languages to differing levels of proficiency. The model can then be given a simulated aphasia-causing stroke, allowing the researchers to test various therapeutic methods to see which provides the greatest improvement in both languages.

"To make a conclusive study of these theories, I'd need to study 1,500 aphasic patients," says Kiran. "But with a model, I can do this—and, as I work with real patients, I can compare their outcomes with the model's outcome, to see how effective a predictor the model is."

That interplay between theory and clinical practice provides an apt parallel to Kiran's research: She uses theoretical knowledge of how language is organized in the brain to create more effective strategies for providing therapy to her aphasic patients. Her clinical research, in turn, has the potential to offer new insight into neuroplasticity—the brain's process of restructuring itself in learning or in response to injury—as well as the very nature of how the human brain processes language.

*This article was originally published in the 2009–2010 edition of Inside Sargent.*



See Swathi Kiran's preliminary work on brain mapping at [www.bu.edu/sargent/bilingual](http://www.bu.edu/sargent/bilingual).

# illiteracy

IS still a major problem in U.S. schools	IS NOT always correctly diagnosed	REQUIRES a radical new approach
1	2	3

Press 1, 2, or 3 to give your answer.  
(They're all correct.)



READING WORDS? NO PROBLEM. IT'S MAKING SENSE OF STRINGS OF THEM THAT GIVES SO MANY MIDDLE AND HIGH SCHOOL KIDS TROUBLE. WITH A COMPUTERIZED TEST, GLORIA WATERS HELPS THEIR TEACHERS FIGURE OUT WHY.

By Patrick L. Kennedy



"CAN WE TAKE THINGS WE'VE LEARNED FROM COGNITIVE PSYCHOLOGY AND APPLY THEM IN A DIAGNOSTIC BATTERY? SO THAT IF TEACHERS KNOW A CHILD HAS A READING PROBLEM, THEY CAN FIND OUT WHY."

GLORIA WATERS

grant [since renewed until 2014 for \$1.6 million] to develop a test battery to assess middle- and high-schoolers' weaknesses across the different skills involved in reading comprehension.

With its range of tests on simple words and complex passages—all chosen very carefully for their various linguistic properties—the battery yields the answers to several key questions, says Waters. "What is it the students are having difficulty with? Do they understand words that have a simple morphology or structure, and not words that have a more complex structure? Do they understand sentences that have simple syntactic structures, but not complex? Do they understand stories where they can get the main idea, but they really don't get the microstructure of the story?"

The computerized battery also measures reading speed. A skilled reader reads automatically, rather than decoding words one at a time, Waters says. Furthermore, the students later take an audio version of the same test. "So you get a sense

whether this is a general language problem the child has, or something very specific to reading."

After analyzing the results, Waters and colleagues present recommendations to the schools. For example, she says, "One of the things we've noticed is that a lot of students have difficulty with individual words when they're words that are morphologically complex—words made up of other words." So they prescribe "teaching students about vocabulary, about relationships between words—things that are critical to understanding text."

"It was really helpful," says Boston school principal Andrew Bott. In his seven years leading the Rogers Middle School in Hyde Park, Bott says the battery is "the only one I've experienced that differentiates among the literacy skills that kids need to develop. To have a battery that tells you about phonemic issues as well as fluency, vocabulary, comprehension—all in an assessment that you get results from really quickly—is invaluable."

Waters and her colleagues continue to calibrate the tests, and in spring 2009 [and once again in 2011] they took the battery to East Syracuse, New York, where 1,300 of the district's middle- and high-school students took it. "A huge data pool," she says. "The results show that kids' ability to deal with complex structures is the most important predictor of their ability to read text—and to do well on high-stakes exams."

Ultimately, Waters's aim is a web-based battery available to schools across the country. But East Syracuse is a great step forward. "It's a rich data set," says the dean, "one people will be analyzing for a long time to come."

*This article was originally published in the 2009–2010 edition of Inside Sargent.*

### Hearatier... Reportize... Factual

No, this isn't TV's *Colbert Report*, whose parodic pundit espouses "truthiness" and other fanciful news values. It's a literacy test, one of a battery developed by Gloria Waters, dean and professor of speech, language & hearing sciences. In the opening salvo of questions you click "yes" or "no," depending on whether the screen presents a real or nonsense word.

*Shoon?* No. *Lork?* No. *Rate?* Ah-ah! Yes.

*Nite.* No, with apologies to sign-painters everywhere.

*Boit.* Perhaps in France, but here? No.

In subsequent exercises, you'll match words to pictures; pick synonyms (*laborious* = *difficult* rather than *difficulty*); decide whether words are related (*Clear* and *clarified*? Sure. *Best* and *bestial*? No); and decide whether sentences (*The man washed herself.*) make sense. Eventually, you'll read passages about the Bastille, Gullah culture, and the manriki (a ninjutsu weapon), and answer questions based on them.

The test battery was administered to about a thousand public middle and high school students in Boston during a two-year period. New York students took a further refined version of the battery in spring 2009.

Waters's methodical work is helping schools pinpoint kids' literacy obstacles as never before. And they could use the support.

Only 31 percent of eighth-graders in the United States are proficient readers, according to the U.S. Department of Education (DOE). In 2009, eighth-graders scored just four points higher on federal reading tests than their predecessors did in 1971.

Encouraged that the scores have at least *risen* four points? Not so fast. Consider that in 1971, factories still powered America's economy. As today's kids graduate without master-

ing reading, they enter the workforce "woefully ill-prepared" for the 21st-century economy and "unable to write effective business communication, read analytically, or solve problems," employers report in trade publications.

"American kids do pretty well, actually, through fourth grade," says Catherine Snow, a Harvard literacy expert and the Boston field site director for the Strategic Education Research Partnership Institute (SERP). "It's at seventh and tenth grade that they look very bad in international comparisons... They're then facing new tasks of reading that are more complicated: reading for content, reading expository text in science and social studies." At this stage, students shouldn't be "reading word by word."

To figure out where the kids' problems lie—and, therefore, how to attack those problems—SERP administered multiple literacy batteries, including Waters's, to Boston Public Schools students in 2007 and 2008.

"It goes all the way back to the original question I had as a clinical psychologist when I started to work with kids who had learning disabilities," says Waters. "Can we take things we've learned from cognitive psychology and apply them in a diagnostic battery? So that if teachers know a child has a reading problem, they can find out why."

The dean is also a prolific researcher in sentence processing and psycholinguistics. For three decades, she and her husband and lab collaborator David Caplan—a Massachusetts General Hospital behavioral neurologist with a PhD in linguistics and an adjunct professor at BU—have used neuroimaging and other techniques to study "which areas of the brain support different aspects of language processing," says Waters, a bilingual Montreal native. Their work may benefit victims of stroke, Parkinson's, and Alzheimer's disease.

That research has informed their work in adolescent literacy. In 2005, Waters and Caplan received a \$1.2 million DOE

### The Trouble with Inventive Spelling By Jennifer Burke

A five-year-old proudly presents his mother with a birthday card with "HAP BRTDA" scrawled on it in purple crayon. Cute? Absolutely. But could the use of inventive spelling, a method often encouraged by teachers, be working against their students? If they're at risk for dyslexia, it just might.

Karole Howland, clinical assistant professor of speech, language & hearing sciences, recently completed research that explores this possibility. "When you're first learning to read, you learn how to sound out words and you learn the rules of phonics," she says. "But you don't stay dependent on that. As

you read words, you automatically start storing a written representation of the word. And that's why you can spell things correctly. You know, for example, that there's no particular reason why chair should be spelled *chair*. It could just as reasonably be spelled *chare*."

Curious about how people with dyslexia form these associations, Howland conducted a study with a group of adults with dyslexia and another group of readers without the disorder that tested their ability to learn the spellings, pronunciations, and meanings of made-up words. Participants were introduced to a made-up word, pronounced *ged*. They later learned that the word was spelled *gaid*, following the same

pronunciation rules as *said*. "The adults with reading impairments couldn't make that adjustment at all and had tremendous difficulty," says Howland.

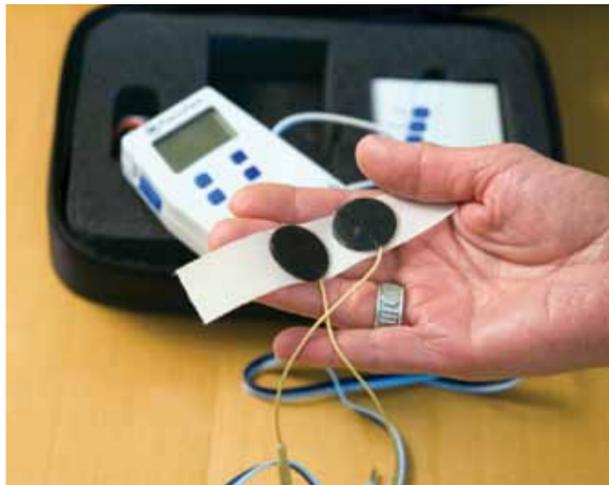
How does this relate to the birthday card? For the typical reader, inventive spelling does have value: it builds skills such as letter association. But for the dyslexic child, sounding out a word and spelling it incorrectly could be detrimental. A better way, Howland suggests, would be "to help that association between correct spelling and pronunciation right from the get-go for any child who has a risk of problems."

# Dysphagia:

## Testing an Electrical Treatment Technique

ELECTRICAL STIMULATION  
COULD HELP THOSE  
SUFFERING FROM A  
SERIOUS SWALLOWING  
PROBLEM.

By Monica Deady Lester



Swallowing is something most of us take for granted, from enjoying the last swig of morning coffee to clearing our throat before making an important announcement.

Individuals with dysphagia or a swallowing disorder may struggle to accomplish these simple activities, explains Clinical Professor Susan Langmore. Beyond difficulty with activities like these, a serious swallowing problem may have even worse health consequences. A person with dysphagia may not be able to eat properly, resulting in weight loss, or they may aspirate, forcing food or liquid into their lungs, which can result in pneumonia.

Langmore explains that while working with swallowing patients, clinicians may try to introduce foods with various consistencies to determine whether a patient may be able to eat a thin or thick liquid. Other ways to help individuals swallow include changing their position while they eat.

While these methods sometimes help a patient, they may not always be successful, and a feeding tube may be necessary to ensure proper nutrition.

Langmore, of the Department of Speech, Language & Hearing Sciences, is researching another method to improve swallowing in patients with dysphagia. Through a grant from the National Cancer Institute at the National Institutes of Health, Langmore is leading an investigation into whether exercise paired with electrical stimulation can improve swallowing problems in head and neck cancer patients three to six months after radiation therapy.

Radiation therapy can cause the tissue in the throat to scar, and scar tissue is not as pliable as regular tissue. Because this scar tissue is not as malleable, when a patient tries to swallow, the throat muscles do not constrict as much as they would in a normal person. The treatment will hopefully keep the

muscles working, so that they do not stiffen, and swallowing will improve.

At 14 different sites around the country, Langmore's study will evaluate the effect of electrical stimulation and exercise on swallowing in 240 patients, who will be randomly placed into one of two groups.

In the experimental group, patients will use an electrical stimulation device, placed on the skin under the chin, along with swallowing exercises. They will undergo three 20-minute sessions a day, six days a week, for three months. During each session, a tone in the electrical stimulation device will indicate that they are to swallow forcefully 60 times over the course of each treatment.

"It's a very intense program," says Langmore, who also sees patients at Boston Medical Center and developed a frequently used procedure for evaluating dysphagia: fiberoptic endoscopic evaluation of swallowing, or FEES. She explains that when the electrical stimulation comes on, it should help the muscles under the tongue contract. This is important because those muscles are active very early in the sequence of swallowing. "I like to think of it as sort of a jump start to the swallow."

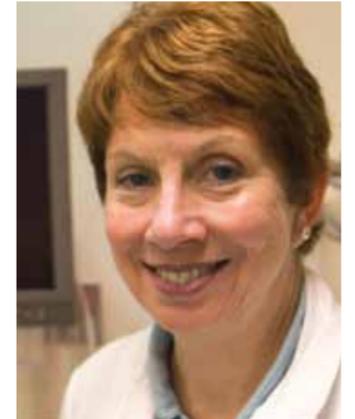
The control group will undergo the same steps, but their device will not administer electrical stimulation.

To determine what part, if any, the electrical stimulation device played in patients' recovery, speech pathologists will measure several swallow parameters from recorded video fluoroscopy studies done before, during, and after treatment. Quality-of-life instruments and other functional measures will be given as well. The goal is to answer the questions, "Does the swallow get better? Does the patient's diet improve and does he or she report a better quality of life?"

While the clinicians who prescribe the therapy for the patients will know who receives a true electrical stimulation device, those who analyze the swallows will not know.

Langmore's clinical trial began in 2007, and the first year was spent preparing clinicians to implement the study, writing pro-

"I BELIEVE THIS STUDY IS IMPORTANT BECAUSE NO ONE HAS EVER STUDIED WHETHER INTENSE EXERCISE REALLY HELPS PATIENTS WITH SWALLOWING PROBLEMS SECONDARY TO HEAD AND NECK CANCER TREATED WITH RADIATION THERAPY."  
SUSAN LANGMORE



cedures, and getting approval from the local institutions' review boards before beginning.

Langmore says that electrical stimulation is used frequently in the field of physical therapy and has also become popular for treating patients with dysphagia, despite a lack of solid research to prove its effectiveness.

"I believe this study is important because no one has ever studied whether intense exercise really helps patients with swallowing problems secondary to head and neck cancer treated with radiation therapy," Langmore says. "Our experience has told us this is effective, but no one has ever proven it." She hopes her efforts shed light on the issue.

"Although I do think it's very promising, we need a good trial to see who it helps," she adds. "I think it will have an impact—whether the results are positive or negative, we're going to know more about the effectiveness of our treatment."

*This article was originally published in the 2008–2009 edition of Inside Sargent.*

# Turning Thoughts into **Words**

A BU SCIENTIST HELPS A MAN  
WITH “LOCKED-IN SYNDROME”  
UTTER HIS FIRST WORDS IN  
TEN YEARS.

By Chris Berdik



Erik Ramsey rests between experimental sessions at Neural Signals, Inc., with Eddie Ramsey (left), Philip Kennedy, and lab technician Jess Bartels.

Before the accident, Erik Ramsey was “a typical teenager,” according to his dad, Eddie Ramsey. He liked to draw and skateboard. He liked sports and girls. But on a November night in 1999, everything typical about Erik Ramsey’s life ended. A car crash caused a brain-stem stroke that left him with “locked-in syndrome”—completely paralyzed but with total cognitive and sensory awareness. Ramsey has almost no voluntary control over his body, except for his eyes, which he uses to answer questions—by looking up for “yes” or down for “no.” Now, thanks to a collaboration between Neural Signals, Inc., a company in the Ramseys’ home state of Georgia, and Frank Guenther, a professor of speech, language & hearing sciences and of cognitive and neural systems, Ramsey may one day regain his ability to speak. With funding from the National Institutes of Health, researchers are creating a “speech prosthesis” that combines a wireless electrode and transmitter from Neural Signals, Inc. implanted in Ramsey’s brain, with a voice synthesizer run by software based on a computer model of the brain’s language centers developed by Guenther’s lab. Together, they aim to turn Ramsey’s thoughts into words.

The collaboration is relatively new, but since 1992 Guenther and his lab team have been working on a computational model of how the brain controls speech. Their model mimics the neural networks involved in producing words—from moving the jaw, lips, and tongue to babbling to processing “auditory targets” stored in the brain of how a word is supposed to sound. Continually refined with data from functional magnetic resonance imaging of people’s brains performing speech tasks, the model learns to control a computer-simulated vocal tract and translate neural signals into words.

In the summer of 2006, Guenther was contacted by Philip Kennedy, founder of Neural Signals, Inc., who had implanted an electrode about six millimeters long into Ramsey’s brain, in the area that controls the tongue, jaw, and lips. The electrode could wirelessly transmit the pulses of about 40 neurons surrounding it. Kennedy’s team had collected extensive data from the electrodes, gathered when researchers asked

Ramsey to imagine speaking specific words. But they couldn’t decode it. Up to a billion neurons are activated when we speak, says Guenther, so to glean much from just 40, “you need to have extremely sensitive techniques.”

Guenther’s lab team used its neural model of speech to guide the design of decoder software that learned to read Ramsey’s mind as he imagined saying vowel sounds. In a clinical trial in 2007, the team was able to predict what vowel sound Ramsey was thinking of with 80 percent accuracy, but not in real time. It later used an improved decoder and a new training protocol in which Ramsey imagined singing along to a series of vowel sounds that moved, for example, from “oooh” to “ahhh.” Once the decoder had been trained to recognize Ramsey’s signal patterns, it was able to drive a synthesized voice that produced the vowel sounds as soon as Ramsey thought them.

“Everybody was just ecstatic that day,” says Eddie Ramsey—including Ramsey, who can still laugh, and did. The next step is consonants, which are more complex, because they involve the closing of the vocal tract. Meanwhile, Neural Signals, Inc. has Food & Drug Administration approval to implant electrodes in four more patients, which would accelerate the development and refinement of the decoder software.

As for Ramsey’s chances of being able to speak again, his father has no doubt it will happen. “It’s kind of equivalent to watching your baby learn to walk,” he says. “He’s got the first steps out of the way, and as soon as he’s got his footing under him, he’ll be off.”

*This article was originally published in the 2008 edition of Boston University’s annual publication, Research.*

# The Conversation: Hearing and Speaking

AN IMPROVED UNDERSTANDING OF THE CONNECTION BETWEEN LISTENING AND TALKING IS HELPING CLINICIANS RESTORE THE JOY OF CONVERSATION TO PEOPLE WITH HEARING PROBLEMS.

By Michele Owens

Even in the womb, we’re eavesdropping on the world around us, and, from the first day of life, we prefer the sounds of the language we’ve heard our parents speak to an unfamiliar tongue. Our alertness as babies to the sounds of familiar words turns us into the facile communicators we’ll be as toddlers. As adults, we need to hear ourselves to speak properly, and we often struggle in a world full of mechanical noise simply to listen to the words of the person sitting across from us.

The auditory system is fantastically intricate, involving not just our ears but a number of highly specialized brain structures whose functions scientists are only beginning to understand. Throughout Boston University, researchers are doing pioneering work to illuminate the ways in which we turn the universe of sound into an intelligible map of information and ideas.

Melanie Matthies, associate professor in BU Sargent College’s Department of Speech, Language & Hearing Sciences [and now also department chair], focuses on the relationship between hearing and speech.

“We’re constantly monitoring our speech,” explains Matthies. “Even people with normal speech who experience significant hearing loss as adults may wind up with imprecise articulation. They can have trouble modulating pitch and loudness.”

Matthies says that people with hearing loss may speak loudly simply because they are not aware of their volume. “Another theory is that we’re desperate to hear our own voices. So we raise the volume or stress to get more auditory feedback—or even just to get the feeling we get when we’re speaking.”

Matthies’ work has done much to illuminate this connection between auditory feedback and speech production, though she is quick to point out that she’s worked with a long-time team of collaborators, who include [Sargent College colleagues] speech scientists Joseph Perkell and Frank Guenther, and psychologist

and linguist Harlan Lane of Northeastern University, allowing her to come at the problem from many different angles. Matthies is the audiologist in this group, and the subjects of their studies are people with normal hearing as well as those with hearing loss, including some people whose hearing loss is severe enough that they are given cochlear implants.

“A replacement cochlea is a very sophisticated electronic substitution,” she says.

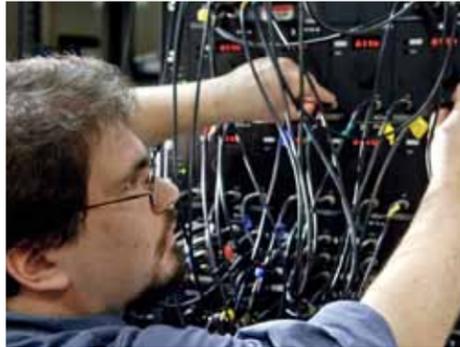
The cochlea is the part of the ear that transduces sound waves to electrical signals that are sent to the brain. It has a tonotopic organization: particular frequencies go to particular spots. “With an implant,” she continues, “since there are a limited number of channels, it’s a tricky thing to divide up the signals in an intelligent way.”

In the lab, she’s been able to use software that simulates different kinds of cochlear implant signals to help pinpoint what information is most important for optimal speech production. Working with the Massachusetts Eye and Ear Infirmary, she’s also followed the developing articulation of people first given implants. Using contrasting vowel sounds, as well as consonant pairs such as “r” and “l,” Matthies has documented significant improvement with a cochlear implant in people whose speech had previously deteriorated due to hearing loss.

“And with cochlear implants,” Matthies emphasizes, “there are huge improvements in people’s lives far beyond the detailed articulation that we study. They’re less tired by communication. They don’t withdraw from society. They continue talking. People want to be intelligible—they want to be understood.”

*This article was originally published in the 2007 edition of Boston University’s annual publication, Research.*

# Advancing Treatment for Hearing Loss



Erick Gallun (above) and Nicole Marrone (right) study the complexities of the auditory system.



THE COMPLEXITIES OF THE HUMAN AUDITORY SYSTEM CAUGHT THE INTEREST OF TWO BU SARGENT COLLEGE RESEARCHERS.

By Liz Savage

Erick Gallun, a postdoctoral fellow, studies the way people employ auditory cues to distinguish competing sounds in a noisy environment. Additionally, he wants to find out how people can process multiple sounds simultaneously once the sounds have been separated.

Gallun's work in the Psychoacoustic Laboratory run by Gerald Kidd, professor of speech, language & hearing sciences, has focused on two main auditory cues—frequency separation and binaural cues—for differentiating sounds.

The ear acts like a prism, breaking the sound up by frequency to be analyzed in the brain, a process known as frequency separation. Binaural cues are used to locate the source of sounds by comparing when a sound hits each ear. If it hits one ear before the other or is louder in one ear, then the brain can figure out which direction it came from.

By understanding how the brain uses these cues to discriminate between sounds, Gallun hopes that better treatments can be developed for people with hearing impairments. “The significance of understanding these cognitive aspects of auditory processing is that only then will it be possible to design devices and cognitive-behavioral training and rehabilitation that take advantage of these cognitive systems,” Gallun says.

Gallun [now a research investigator at the National Center for Rehabilitative Auditory Research] takes a personal interest in this subject. Halfway through graduate school, he was diagnosed with a benign tumor growing on his auditory nerve that left him completely deaf in his right ear. Since he lost his binaural hearing, he has found it especially challenging to separate competing sounds: “I have come to understand my own difficulties better and to see ways to try to find solutions for myself and for others. Many of the problems I study are not specific to me, but my interest in rehabilitation and auditory processing has been profoundly impacted by my experience.”

Nicole Marrone ('04, '07), an audiologist and doctoral candidate [now an assistant professor at the University of Arizona], also wants to better understand auditory processes in order to improve the lives of people with hearing impairments. Her research seeks to verify the results of a controversial paper on the use of hearing aids.

Since it is common sense that two ears are better than one, it seems safe to assume that, for people with hearing loss, two hearing aids would be better as well. Indeed, this was the widely held belief until a paper was published in 2005 that suggested otherwise.

Given the benefits of binaural hearing, the claim that just one hearing aid could actually be better seemed so counter-intuitive that Marrone had to find out for herself.

“It's possible that hearing aids change the subtle cues of binaural hearing,” Marrone says. If that is the case, then there could be people who would benefit more from just one hearing aid.

With a grant from the National Institute on Deafness and Other Communication Disorders, Marrone and Kidd are looking specifically at people's ability to listen to someone talking when there are other speakers in the background. For people using hearing aids, it can be especially challenging to focus on one conversation when there are others going on nearby. While hearing aids are very good at amplifying speech sounds, the problem is that they amplify all speech sounds, leaving the listener with the challenge of segregating a friend's voice from someone at the next table.

Marrone is testing a number of variables to see who, if anyone, should consider using only one hearing aid. For instance, she is comparing younger and older people with hearing loss to test one hypothesis that aging affects the ability to use binaural cues to distinguish speakers. To test listening conditions that are more realistic than the typical sound booth, she is using a unique laboratory space in Sargent College that allows the reverberation characteristics of the room to be changed.

By studying the complex processes of the auditory system, both Gallun and Marrone are working toward more advanced treatments for hearing loss that could improve the lives of the hearing impaired.

*This article was originally published in the 2006 edition of Inside Sargent.*



A COMMUNITY CENTER BRINGS RELIEF TO THOSE STRUGGLING WITH A WORLD TURNED UPSIDE DOWN BY A STROKE.

By Andrew Thurston

Jen Maietta leading a newsletter group for people with aphasia.

## Finding the Right Words

Pat Price doesn't feel any different; it's just the world that feels upside down. Hit by a stroke in 1996, Pat awoke with aphasia, a chronic disorder that impairs language. Some people assume she's stupid, but Pat can't even find the words to blame the stroke. So, she's found other ways to communicate. Every week, Pat walks into the Aphasia Community Resource Center, sits down, and starts writing, telling her story of a world gone “topsy-turvy.”

Every year, more than 100,000 Americans are diagnosed with aphasia. For most, it's caused by a stroke, for others, it's a consequence of a head injury or tumor. For all, it's a chronic condition that makes the world a tougher place to understand. Simple words can be hard to find, other people may make little sense, and reading and writing can turn from easy pleasures to hard labor. The Aphasia Community Resource Center at BU Sargent College provides a refuge, a place where patients and their families can learn to live with the disorder.

For the first three days of every week, patients join small groups—led by Sargent College graduate students—covering film, photography, writing, and more. One Saturday every month, the Aphasia Community Group—founded in 1990— attracts upwards of 100 people.

Pat Price is in Jen Maietta's ('08) newsletter group. Every semester, Maietta and other graduate students help Price and some half-dozen others get their thoughts on paper and, whether it's about a trip to Kalamazoo or support for Veterans for Peace, publish them in a regular newsletter. Though just 11 simple sheets of stapled green paper, the *Aphasia Times* is a triumph of wills.

“It's important to be able to tell your story,” says Maietta. “It takes the whole semester to get everyone to write an article. The breakdown with these patients can lie anywhere; coming up with an idea or finding the right word can be hard for them.

“Spelling is tremendously difficult for a lot of people too—we have a member who will say, ‘Color, color, how do you spell color?’, and he'll sit there and just say ‘color’ over and over, until it finally comes to him.”

There's no magic cure for the condition, so strategies like that are essential if people are to learn to “recover with aphasia rather than recover from aphasia,” according to speech-language pathologist and center founder, Jerome Kaplan.

“Aphasia is a chronic condition, which in most instances diminishes over time,” says Kaplan. “It's an adjustment process as well as a recovery process.”

That doesn't mean that progress isn't often dramatic. Maietta also runs a computer training group; in the first session she held this semester, it took more than an hour for her class, which can include anyone from former “professors, lawyers, and doctors to top business people” to log on to their email. Now, they're all up and running in less than 10 minutes.

“You can definitely improve their abilities,” says Maietta. “Sometimes it's just about confidence, but people in our center improve their language and their speech. In the writing group, you can see people improve, even over one semester—people who were leaving out whole words from their sentences start to include them, conjugate verbs correctly, and keep the right endings on words. It's amazing to see.”

For all the instances of vast improvements in communication abilities, Maietta, Kaplan, and others at the center always come back to confidence.

“One of the cruelest things about aphasia,” says Kaplan, “is that it terrifies people, and when you don't feel safe, you don't try to communicate. Our goal is to encourage a sense of comfort and safety, in order to take risks.

“The efficacy of groups is in part because participants encourage and support one another and teach one another. They also see themselves as teaching our students.” >>

> Kaplan adds that the center, which is housed on the upper floors of Sargent College, gives students an opportunity they wouldn't have in rival programs.

"This is a unique, wonderful opportunity. I had nothing like this when I was a student; it's relatively rare for graduate students to have the opportunity to work in a center specifically designed for treatment of adult neurogenic communication disorders."

Maietta is preparing to join the world of work and concedes that the center's impact will be hard to shake. She promises to refer people to it when she's in the field and admits that while her ambition is to work with children, the experience has opened her mind to other career possibilities.

But as the graduates come and go, the patients remain, showing up every week—one has been a regular at the community group for two decades—for their fix of confidence and a chance to slowly turn the world right side up.

*The work of the Aphasia Community Resource Center is supported in part by the Boston Foundation and also by a generous gift from Mynde S. Rozbruch Siperstein ('78) and Gary S. Siperstein (SMG'80), which funded the Siperstein Aphasia Community Resource Room.*

*This article was originally published in the summer 2008 edition of BU Sargent College's publication for alumni and friends, Impact.*

### THE TOPSY-TURVY WORLD OF APHASIA

By Pat Price

"To me I was the old Pat Price, but the world was turned topsy-turvy. Some thought I was stupid because of my faulty speech. I still couldn't find the words to say 'it is because I had a stroke.' My actions and speech were slow and remembering things was hard...To this day, I cannot order food without pointing at the menu; but I get the correct order.

"What do I wish for the future? I wish everyone knew and understood our problems. Perhaps Congress will take a day off from playing politics and take a hard look at aphasia needs. It is not so hard to understand. There is no quick fix...We need patience, hours of speech therapy, and long-time funding."

Excerpted, with permission, from "The Ups and Downs of the Topsy-Turvy World of Aphasia" by Pat Price. First printed in the *Aphasia Times*, Fall 2007.



## Learning While Helping Others

IT'S HARD TO SAY WHO BENEFITS MORE FROM BU SARGENT COLLEGE PROFESSORS' HANDS-ON TEACHING STYLES—THE STUDENTS WHO GAIN INVALUABLE EXPERIENCE, OR THE PEOPLE THEY HELP.

By Monica Deady Lester

### Free Hearing Screenings

Hearing loss can dramatically affect academic performance, yet many schools lack the resources necessary to screen students. Ann Dix, clinical assistant professor of speech, language & hearing sciences, runs the BU Hearing Screening Program, which provides free screenings in schools throughout Greater Boston.

In 2007, Dix's first-year speech-language pathology graduate students screened approximately 1,000 children in fourteen schools and preschools, including the BU Children's Center.

They examined ear structure, evaluated eardrum mobility, and conducted hearing tests. They also created detailed reports for children who failed the test.

Erica Joseffy ('09) learned to adapt the test for her audience. "It is difficult to determine whether preschoolers misunderstand our directions or can't hear. To help eliminate this confusion, we played together. The children held blocks by their ears and put them down when they heard a tone. Once

the group mastered this skill, we tested the children individually," Joseffy explains.

One of the sites that benefited from the screenings was Dearborn Academy, a Boston-area K-12 public school for children with emotional or behavioral issues. "A lot of our children do not receive proper medical care. The kids can be challenging, but the Boston University students are incredibly professional and have done wonders with them," says School Nurse Diane Melia.

### Overcoming Literacy Problems

Clinical Assistant Professor Kerry Howland and her graduate students provide services to students at risk for language and literacy problems at the Baldwin School in Brighton, Massachusetts, a pilot school that enrolls a diverse group of children, including many who are learning English.

Howland's students worked in teams of two with pre-kindergarten through first grade students on phonological awareness, sound-symbol correspondence, and early decoding and comprehension skills.

"Phonological awareness is breaking words into sounds followed by sounding out words—all early reading skills. One training technique the children loved involved feeding puppets. For instance, the bear puppet only eats foods that begin with *Bs*. They loved to tell whether he should eat an item or spit it out," says Howland.

Shannon Rice ('09) recalls her experience teaching sound symbol correspondence using the Telian-CAS Lively Letters Program. "I showed a card with an *I* that looked like a person shooting a basketball alongside a crowd cheering 'Get it in!', a phrase that focused on the *I* sound. The cards simplified the connection between letters and their sounds for the children."

*This is an extract from an article that was originally published in the 2008-2009 edition of Inside Sargent.*

### LEARNING FROM THE CLINIC

By Jennifer Burke

Megan had run into trouble with language early on, but she'd always managed to get by. Now she was truly struggling. Standardized testing reveals little; her skills—vocabulary, grammar, decoding, math—look fine. It's when she tries to put them all together that the red flags fly. She can't read a story and then explain what it was about. She can't make inferences. She's a reluctant writer. She's stumped by word problems.

This case is fictional, but it's a typical profile of a child that Clinical Associate Professor Kristine Strand sees in her work each Thursday as part of the Learning Disabilities Program at Children's Hospital Boston. Sargent students often join the program during clinical placements. As the senior speech language pathologist, Strand collaborates with a team of experts—a neurologist, a neuropsychologist, a math specialist, and a psychologist—to conduct evaluations for children ages 7 to 17 with a range of learning disabilities. The goal of the assessment is to provide a comprehen-

sive learning profile of a child and recommend next steps for parents and schools. The diverse structure of the team allows the experts to look at each case from various perspectives: Does the child's educational program appropriately match their abilities? Do they have a medical issue? Do they need psychological support?

Strand finds that her hospital work allows her to make a connection between research and practice in the classroom at BU Sargent College. "It really informs my teaching," she says. "The children we see come from all over the world and have a complex array of learning problems. Because I'm a clinical faculty member, the clinical world is my research world, and this allows me to stay on the cutting edge."



Kristine Strand

# Fluency Group Empowers Adults Who Stutter

BY EXPLORING ATTITUDES TOWARDS STUTTERING, A GROUP LED BY FACULTY AND STUDENTS HELPS PEOPLE PURSUE DREAM JOBS AND CONNECT WITH THEIR FAMILIES.

By Karen Soroca



A patient at the Sargent fluency clinic.



Helping people overcome the challenge of stuttering (from left to right): Adriana DiGrande and Diane Parris.

The Fluency Group at the Joseph Germono Fluency Clinic—part of BU Sargent College—has helped hundreds of adults overcome the challenges associated with stuttering. Clinical faculty members Adriana DiGrande and Diane Parris codirect the group, which also gives graduate students the valuable experience of treating individuals who stutter. Unfortunately, many speech pathologists do not feel comfortable treating patients who stutter because they do not have this type of hands-on experience.

Misconceptions swirl around stuttering because the cause of this disorder—which affects one percent of the population—is unknown. “Stuttering is not only what a person does when they stutter, i.e., prolongations (lllllike), blocking (no sound), and repetitions (li-li-ke), but also how they think and feel about themselves and the listener. In this way, stuttering may negatively impact all aspects of a person’s life,” explains [Lecturer] DiGrande.

To help fluency group members explore their attitudes and beliefs about stuttering in a nonthreatening way, they draw what it feels like to stutter. One powerful self-portrait depicts a man imprisoned behind bars with eyes all around him. Attached to the sketch is a simple statement: “Everybody is watching me and therefore I feel like I have no options. Stuttering rules my life.”

Those who stutter are no more likely to have psychological or intelligence deficiencies than those who do not. However, without support, stuttering can affect all aspects of an individual’s life—whether they go to college, who they marry, what type of job they take, and where they live—and can often be crippling. On the other end of the spectrum, stuttering may play only a minor role in the lives of individuals who overcome the disorder, like James Earl Jones, the voice of Darth Vader.

The Fluency Group is made up of adults who are ready for a change. Some are about to enter the workforce or

change jobs, while others want to be role models for children who stutter. Approximately 60 percent of individuals who stutter have a family member who also does so.

The group follows the academic semester schedule and meets for two and a half hours each week. During the first hour, graduate students run one-on-one sessions that focus on establishing fluent speech and teaching clients different strategies to manage the behavioral aspects of stuttering. This includes how to coordinate muscles so speech is easier, how to synchronize breathing with speech, and how to use a gentle approach to speech production. Clients work through a hierarchy of drills, first tackling words and then moving on to sentences and conversations. Once these drills are mastered in a one-on-one setting, the client practices the drills on the phone and then in a public location.

Following this, a student and a group member together facilitate a group dis-

**“I WAS STRUCK BY THE WAY THE GROUP FELT SO COMFORTABLE TALKING ABOUT THEIR CHALLENGES AND BREAKTHROUGHS—THEY INSPIRED ONE ANOTHER. HEARING WHAT IT WAS LIKE FROM THEM PROVIDED INSIGHT AND EXPERIENCE THAT YOU CAN’T FIND IN THE CLASSROOM, AND IT INSPIRED ME TO WORK WITH PEOPLE WHO STUTTER.”**

CHRISSEY DEERY ('07)

ussion about the issues surrounding stuttering. “One year, the group’s concerns centered on the theme of jobs. Did I lose a job because I stutter? Can I get a certain type of job in spite of stuttering? Should I tell an interviewer that I stutter before we begin our conversation?” says [Clinical Associate Professor] Parris.

At the end of the semester, the group, made up of professionals from varied backgrounds—including doctors and lawyers—hosted a career fair for chil-

dren who attend stuttering programs at the clinic to encourage them to go after their dream jobs.

Another year, the desire to help others understand the stuttering experience led to Family and Friends’ Night at the clinic. For one woman, the evening marked the first time she truly opened up to her husband about the affect stuttering had on her life; another who attended found comfort in understanding that her son’s refusal to answer the telephone was common and not a reflection of him as an individual.

“I was struck by the way the group felt so comfortable talking about their challenges and breakthroughs—they inspired one another. Hearing what it was like from them provided insight and experience that you can’t find in the classroom, and it inspired me to work with people who stutter,” says Chrissy Deery ('07), a graduate of the master’s program in speech-language pathology who is now working at Children’s Hospital Boston.

John Jones, who joined the group in 2001, credits the program with giving him the opportunity to achieve his fluency goals—speaking at a slower rate, stretching syllables, and establishing and maintaining eye contact with his listener—even during a speech block. “The years [since I joined the program]... have been the most rewarding [of my life] simply because by accepting myself, I can put myself into any situation I choose and deal with it the way I’ve always imagined. My life has just begun,” Jones says.

BU also hosts a regular conference at Sargent College with the Stuttering Foundation of America at which 20 speech-language pathologists from the United States and Canada attend a five-day workshop provided by leading stuttering research and therapy experts, including DiGrande and Parris.

*This article was originally published in the 2007–2008 edition of Inside Sargent.*

## An Insight into Interdisciplinary Care

By Jennifer Burke

The mother of a child with autism sits in a BU Sargent College lecture hall before an audience of graduate students. She has come to tell her family's story and give students an honest look at how autism can impact a family. She tells them she wants to be a parent and not a therapist; she simply wants her family to live their lives.

After her presentation, a panel of faculty members from the College's programs in speech-language, occupational therapy, physical therapy, and nutrition assesses the case and recommends various treatment approaches.

This special event, Interdisciplinary Grand Rounds, is offered to graduate students once a semester and mirrors the "rounds" that commonly take place at hospitals.

The concept was developed by Elizabeth Gavett, clinical associate professor in the Department of Speech, Language

& Hearing Sciences, and Ellen Cohn, clinical professor in the Department of Occupational Therapy. They'd found that students—so immersed in their individual studies—were not interacting with their peers in other fields.

"We're preparing these professionals to work in health care environments," says Cohn, "and most health care environments are interdisciplinary."

In clinical care, teams of specialists work together, and the rounds give practitioners-in-training a chance to learn what other specialists bring to the table.

"So often in students' early preparation they learn a lot of theory in class, and it's wonderful for them to see patients and connect the theory to what they're going to be practicing," says Gavett.

Since the rounds began in 2007, students have seen patients with a range of illnesses, from aphasia to traumatic brain injuries. According to Gavett, the most memorable was a 62-year-old man with Parkinson's disease who not only showed "that the patient is the expert on his condition and an essential part of the interdisciplinary team," but was also the first patient to take part in the rounds, proving just how powerful such a class can be.



## Events at Sargent

By Erica Lieberman

### A FAMILY VIEW OF REHABILITATION

Neurological damage can devastate a whole family, not just the patient. Acclaimed author Lee Woodruff has seen the impact firsthand—her husband, ABC News reporter Bob Woodruff, suffered a traumatic brain injury after being wounded by a roadside bomb in Iraq in 2006. Together, the couple chronicled the grueling recovery process in their 2007 bestseller, *In an Instant: A Family's Journey of Love and Healing*.

Presenting the second annual Meredith E. Drench Lecture in 2010, Woodruff focused on the critical roles her family played and the rehabilitation professionals who inspired them. "I honor you," she told the BU Sargent College audience. "You are really where the rubber meets the road in this journey." In her talk, "Life Changes in an Instant: A Caregiver's Journey," Woodruff predicted exciting changes in the field of neurorehabilitation in the next 20 years.

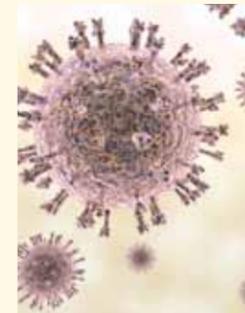
You can watch Woodruff talk about her family's journey at [www.bu.edu/sargent/features/woodruff](http://www.bu.edu/sargent/features/woodruff).

### LESSONS LEARNED DURING A PANDEMIC

Richard Besser was named Acting Director of the Centers for Disease Control and Prevention (CDC) in early 2009, less than three months before the H1N1 flu virus hit U.S. shores. With the Obama administration still in transition, Besser led America's premier public health agency through its first pandemic in decades.

Now an ABC News medical editor, Besser was the guest speaker at the eleventh annual Dudley Allen Sargent Lecture. His talk, *Pandemics, Public Health, and Political Transition*, touched on several aspects of the crisis, from communication strategy to the interplay of science and policy in decision making. On a key question of public health priorities—whether to focus on low-probability disasters or urgent, ongoing health issues—Besser said the pandemic clearly demonstrated the need to do both.

You can watch Besser give his take on the U.S. response to H1N1 at [www.bu.edu/sargent/besser](http://www.bu.edu/sargent/besser).



### APHASIA RESOURCE CENTER TURNS 20

More than one million Americans live with aphasia, an acquired, still incurable communication disorder caused by damage to language zones in the brain. Boston-area residents and families living with aphasia have found clinical treatment, education, and support for the past 20 years at the Aphasia Resource Center at BU Sargent College.

Founded in 1990 by speech-language pathologist Jerome Kaplan, the center now welcomes up to one hundred guests to its monthly meetings, while classes and conversation groups draw up to fifty people every week.

The center offers an excellent training environment for Sargent College students and has also committed to ambitious research goals. Staff members aspire to make the center the nation's preeminent aphasia clinical research and rehabilitation resource.

At an event to mark the center's anniversary, aphasia survivors (above) presented a reading of *Voices of Aphasia*, a play about the impact of aphasia from a caregiver's perspective written by center cofounder Judy Blatt.

### FILMMAKER BRINGS PARKINSON'S DISEASE INTO FOCUS

Few people have done more to increase awareness of Parkinson's disease than PBS *Frontline* correspondent Dave Iverson. His 2009 documentary, *My Father, My Brother, and Me*, explored the medical research and political debate surrounding a disease that has affected several of his family members, including himself.

The Center for Neurorehabilitation invited the longtime writer, producer, and director to speak at Sargent College to mark Parkinson's Disease Awareness Month and the launch of a new national resource center at BU (see page 22).

You can watch Iverson's talk, "Frontline Feedback: A Filmmaker and Patient's Perspective," at [www.bu.edu/sargent/features/iverson](http://www.bu.edu/sargent/features/iverson).



Terry Ellis and her team are using exercise to improve the lives of people with Parkinson's disease.

## BU Opens First-in-Nation Parkinson's Resource Center

By Erica Lieberman

The American Parkinson Disease Association (APDA) and BU Sargent College have established the country's first national resource center for people with Parkinson's disease. Funded by the national APDA and its Massachusetts chapter, the National Resource Center for the Rehabilitation of People with Parkinson's Disease includes a toll-free exercise advice helpline for patients, caregivers, and health care professionals.

Helpline calls, which already average 100 every month, are answered by licensed physical therapists at Sargent College's Center for Neurorehabilitation. Callers can receive basic information, request a free APDA exercise handbook, and get referrals to board-certified physical therapists in their communities.

The center's director is Terry Ellis, a leader in neurological physical therapy research and clinical associate professor in the Department of Physical Therapy & Athletic Training at Sargent College. "Exercise is now seen as medicine," says Ellis. "Soon it may be shown to slow the progression of Parkinson's disease in humans as it does in animals. But there's no need to wait—we already know it improves patients' quality of life."

The center's toll-free helpline number is 1-888-606-1688.

## The Science Behind the Clinic

By Andrew Thurston

Children with a broad range of language disorders could soon benefit from research breakthroughs pioneered at Sargent College.

Michelle Mentis, a newly appointed clinical professor, is planning to launch clinically based research projects that draw on her experience treating kids with language problems resulting from traumatic brain injuries, developmental disabilities, and more.

This is a return to Sargent for Mentis, who first taught at BU during the 1990s before leaving to open a private practice specializing in pediatric language disorders. She says coming back allows her to bring "the wealth of clinical experience that I have had over the last ten years to my teaching." With a career that's included lab work and patient care, she's also looking forward to teaching students about "the science that underlies clinical practice." According to Melanie L. Matthies, associate dean and chair of the speech, language & hearing sciences department, Mentis's "excellence in scholarship, teaching, and service will greatly benefit the students and faculty in our department, as well as BU Sargent College."



Michelle Mentis

## Highlights

### INTERNATIONAL TOUR

Clinical Professor Susan Langmore (below) presented lectures and workshops on dysphagia in Italy, South Korea, Germany, and Saudi Arabia in the past year. You can read more about Langmore's work on dysphagia on page 10.



### SARGENT HOSTS STUDENT ASSOCIATION

The National Student Speech Language Hearing Association held its annual conference at BU Sargent College in April 2010. Laurie Cutting from Vanderbilt University was the keynote speaker, with "Cognitive and Neurobiological Mechanism of Reading Development and Disorders."

### EXPERT HELP FOR MUSEUM OF SCIENCE

Clinical Associate Professor Elizabeth Gavett, along with faculty from the occupational therapy program and the director of disability services at BU, collaborated with the Museum of Science, Boston, to conduct programs and training to make the museum more accessible to children with autism spectrum disorders and their families.

### STUTTERING FOUNDATION WORKSHOP

The Department of Speech, Language & Hearing Sciences hosted the Stuttering Foundation of America's Eastern Workshop in June 2010. The weeklong program included presentations by Frances Cook and Willie Botterill of the Michael Palin Centre for Stammering Children, who offered insight into cognitive behavioral therapy and solution-focused therapy.

### FREE HEARING TESTS FOR KIDS

Graduate students in the speech-language pathology program conducted approximately 1,000 hearing screenings and 250 hours of literacy enrichment training to Boston-area schoolchildren during 2009–2010.



### INTERNATIONAL STUTTERING EXPERTISE

Clinical Associate Professor Diane Parris (right) was sponsored by the Stuttering Foundation of America to attend a monthlong training program at the Michael Palin Centre for Stammering Children in London, England. The Palin Centre uses a cognitive approach to parent/child interactions to facilitate speech fluency. You can read more about Parris's work to help adults overcome the challenges associated with stuttering on page 18.



### ADJUNCT HONORS

The following adjunct instructors were honored in 2010 for their long-standing contributions: Barbara Oppenheimer, director of pediatrics at Newton-Wellesley Hospital; Rick Sanders, senior speech-language pathologist at Spaulding Rehabilitation Hospital; Glenn Bunting, clinical director of the Voice Center at Massachusetts Eye and Ear Infirmary; and Adriana DiGrande, director of the New England Fluency Program.

## Faculty

**Ann Dix** Clinical Assistant Professor

**Elizabeth A. Gavett** Clinical Associate Professor and Director of BU Speech, Language & Hearing Center

**Frank Guenther** Professor

**Elizabeth Hoover** Clinical Assistant Professor and Clinical Director, Aphasia Resource Center

**Karole Howland** Clinical Assistant Professor

**Gerald Kidd** Professor

**Swathi Kiran** Associate Professor

**Susan E. Langmore** Clinical Professor

**Melanie L. Matthies** Associate Dean, Department Chair, and Associate Professor

**Michelle Mentis** Clinical Professor and Program Director, MS-SLP

**Diane Parris** Clinical Associate Professor

**Kristine Strand** Clinical Associate Professor and Undergraduate Program Director

**Gloria Waters** Dean and Professor

## Affiliated Faculty

**Jason Bohland** Assistant Professor of Health Sciences

**Glenn Bunting** Adjunct Clinical Assistant Professor

**David Caplan** Adjunct Professor

**John Costello** Lecturer

**L. Clarke Cox** Clinical Associate Professor

**Lorraine Delhorne** Lecturer

**Adriana DiGrande** Lecturer

**Natalie Howard** Lecturer

**Kara Larson** Lecturer

**Seton Lindsay** Lecturer

**Christine Mason** Senior Research Scientist

**Barbara Oppenheimer** Adjunct Clinical Associate Professor

**Joseph S. Perkell** Senior Research Scientist

**Adele Raade** Adjunct Assistant Professor

**Rick Sanders** Adjunct Clinical Associate Professor



## Grant Awards

BETWEEN JULY 2010 AND JUNE 2011, BU SARGENT COLLEGE'S DEPARTMENT OF SPEECH, LANGUAGE & HEARING SCIENCES SECURED \$1,749,033 IN FUNDING TO CONDUCT RESEARCH ON EVERYTHING FROM SPEECH PRODUCTION TO IMPROVING READING SKILLS. HERE'S A SAMPLE OF THE PROJECTS AND THE AGENCIES SUPPORTING THEM.

Principal Investigator	Title of Project	Agency
Jason Bohland, Assistant Professor	The Online Brain Atlas Reconciliation Tool	National Institutes of Health (NIH), sub-contract via Cold Springs Harbor Laboratory
L. Clarke Cox, Clinical Associate Professor	Hearing Acuity, Cognitive Aging, and Memory for Speech	National Institute on Aging (NIA)
Frank Guenther, Professor	Constructing an Electroencephalograph-Based Brain-Computer Interface for Augmentative Communication	DynaVox
	Neural Modeling and Imaging of Speech	NIH/National Institute on Deafness and Other Communication Disorders (NIDCD)
	Sequencing and Initiation in Speech Production	NIH/NIDCD
Gerald Kidd, Professor	Central Factors in Auditory Masking	NIH/NIDCD
	Core Center Grant—Sound Field Laboratory (Core 1)	NIH/NIDCD
	Spatial Hearing, Attention, and Informational Masking in Speech Identification	U.S. Air Force
Swathi Kiran, Associate Professor	Application of Multimodal Imaging Techniques to Examine Language Recovery in Post-Stroke Aphasia	NIH/NIDCD
	Semantic Fracture Analysis in the Treatment of Lexical Retrieval Deficits in Spanish-English and French-English Bilingual Aphasia	American Speech-Language-Hearing Foundation
	Theoretically-Based Treatment for Sentence Comprehension Deficits in Aphasia	NIH/NIDCD
Melanie L. Matthies, Associate Dean, Department Chair, and Associate Professor	Effects of Hearing Status on Adult Speech Production	NIH/NIDCD
Joseph S. Perkell, Senior Research Scientist	Effects of Hearing Status on Adult Speech Production	NIH/NIDCD
	Neuroanatomical and Behavioral Anomalies in Persistent Developmental Stuttering	NIH/NIDCD
Gloria S. Waters, Dean and Professor	Assessment of Comprehension Skills in Older Struggling Readers	U. S. Department of Education
	Functional Neuroimaging Studies of Syntactic Processing	NIH/NIDCD, subcontract via Massachusetts General Hospital

