RESEARCH HIGHLIGHT

Recognizing voices depends on language ability

Study finds that for people with dyslexia, it’s much harder to identify who is speaking.

Anne Trafton, Original article posted on MIT News

Distinguishing between other people’s voices may seem like a trivial task. However, if those people are speaking a language you don’t understand, it becomes much harder. That’s because you rely on individuals’ differences in pronunciation to help identify them. If you don’t understand the words they are saying, you don’t pick up on those differences.

That ability to process the relationship between sounds and their meanings, also known as phonology, is believed to be impaired in people with dyslexia. Therefore, neuroscientists at MIT theorized that people with dyslexia would find it much more difficult to identify speakers of their native language than non-dyslexic people.

In a study appearing in Science on July 29, the researchers found just that. People with dyslexia had a much harder time recognizing voices than non-dyslexics. In fact, they fared just as poorly as they (and non-dyslexics) did when listening to speakers of a foreign language.

The finding bolsters the theory that impaired phonology processing is a critical aspect of dyslexia, and sheds light on how human voice recognition differs from that of other animals, says John Gabrieli, MIT’s Grover Hermann Professor of Health Sciences and Technology and Cognitive Neuroscience, senior author of the Science paper, and MIT CRC’s Program Director.

"Recognizing one person from another, in humans, seems to be very dependent on human language capability," says Gabrieli, who is part of MIT’s Department of Brain and Cognitive Sciences and also a principal investigator at the McGovern Institute for Brain Research.

Verbal cues

The lead author of the study, MIT graduate student Tyler Perrachione, earned his undergraduate and master’s degrees at Northwestern University, where he was involved in studies showing that it is easier to recognize voices of people speaking your own language. "Everybody’s speech is a little bit different, and that’s a big cue to who you are," he says. "When you’re listening to somebody talk, it’s not just properties of their vocal cords or how sound
**Cultural Competence in Research Symposium**

Wednesday, March 28, 2012, 3-5pm

Please join Harvard Catalyst, University of Massachusetts-Boston and Dana-Farber/Harvard Cancer Center for an interactive symposium featuring the Bok Players, exploring: Establishing trust across cultures; respecting diversity of communities; dealing with unconscious personal bias and stereotyping; engaging diverse communities in research; obtaining consent from minority populations; and encouraging minority accrual in clinical research. This event’s intended audience includes junior and senior investigators, research nurses, coordinators, and staff engaged in biomedical or social and behavioral research. This program meets the requirements of the Board of Registration in Nursing, at 244 CMR 5.00, for 2 contact hours of nursing continuing education.

Location: Dana-Farber Cancer Institute Jimmy Fund Auditorium, 35 Binney St. Boston.

**Register here:**
www.u54seminar.com

**SHRINE Query Prizes**

Applications due April 19, 2012. Up to 20 prizes of $2,500 will be awarded by Harvard Catalyst for research projects that address important health problems through querying clinical data using the SHRINE web-based query tool. Winners of this query prize will comprise the limited pool eligible to apply for $50,000 one-year research grants to support efforts to secure patient-level data based on SHRINE results. The Shared Health Research Information Network (SHRINE) from Harvard Catalyst helps researchers overcome one of the greatest problems in population-based research, locating sufficient numbers of well-characterized, de-identified patients. SHRINE queries result in a total number of patients that meet a given set of clinical criteria across the five participating hospitals: BIDMC, BWH, CHB, DFCI, and MGH. For details and the complete RFA, email shrine_pilots@catalyst.harvard.edu, or visit the Harvard Catalyst SHRINE Competition website at: http://catalyst.harvard.edu/services/pilotfunding/shrine.html

**Education Video Library**

This online video library is a dynamic catalog of past courses, seminars, and lectures sponsored by Harvard Catalyst. The library contains videos from some of Harvard Catalyst’s most popular courses, including Introduction to Clinical Investigation and Intensive Training in Translational Medicine. The video library will continue to be updated as new offerings become available. All members of the Harvard Catalyst community are eligible to access the library. Videos are organized by category and not by course or event.

The online video library can be found at: http://catalyst.harvard.edu/services/educationvideolibrary/

**Simplifying the IRB process for multicenter studies**

To help facilitate multisite human studies (e.g., clinical research, social or behavioral studies, or research using human tissues) by reducing duplicative IRB review, 24 Harvard Catalyst-participating institutions developed the online IRB Cede Review Form. This increases the efficiency of the IRB process, and will remove a significant hurdle for collaborative research efforts among investigators at the participating institutions.

Investigators can submit an online application requesting that all the IRBs from different institutions participating in a multicenter study agree to rely on the formal review by only one of the involved IRBs. Each participating IRB makes the decision on a protocol-by-protocol basis whether to rely on the review of another IRB (to cede the review) or to conduct its own full review. If approved, participating IRBs defer or cede the review to one IRB and accept its decisions. Therefore, investigators do not have to present to multiple IRBs and deal with possibly different requests. The form may be used for any multisite study, which involves at least one Harvard Catalyst participating institution.

The IRB Cede Review Form has been designed to make the request process as broadly applicable as possible. It may be used for new protocols or to request the addition of a new site to an existing protocol. It can be used to support multicenter studies that include sites beyond Harvard and its affiliated hospitals, including international sites. Additionally, submission of the form ensures that all pertinent parties are notified of the application and its status.

The process: Investigators should use this form before submission of an IRB application, but after their research plans have been finalized. While not all studies will be eligible for...
LOCAL CRC updates

BIDMC

Clinical Research Coordinator Support Services
Partially funded through Harvard Catalyst, the BIDMC Clinical Research Coordinator Core is available to support and collaborate with investigators and their research teams in all phases of clinical research, providing services that include assisting with the organization, implementation and completion of clinical research studies.

The Clinical Research Coordinator Core is staffed with two full-time research coordinators and a pool of per diem staff, all trained in providing clinical research support services. Use of the Clinical Research Coordinator Core allows an investigator to access expertise in conducting clinical investigation and provides flexibility in both staffing and cost.

“We performed an outpatient pharmacokinetic study on acetaminophen metabolism at the CRC. We relied on the Coordinator Core to schedule the subject visits, obtain consent, follow up on labs and generally coordinate the day-to-day ongoings of the study.” says Michael Ganetsky, MD, a recipient of a Harvard Catalyst pilot grant. The project was completed in under three months from study initiation.

The Clinical Research Coordinator Core is a fee for service core facility. The CRC Core Manager and the investigator will meet at the start of the study to determine the approximate time needed for a given project. Fees vary based on whether the project is investigator-initiated or industry-initiated. Limited pro bono support is available for junior investigators conducting investigator-initiated studies and for investigators who have received a Harvard Catalyst pilot grant.

For more information about the services of the Clinical Research Coordinator Core at BIDMC, please contact Michelle Beck (mbeck1@bidmc.harvard.edu).

BWH

Postprandial Apolipoprotein B Metabolism—Principal Investigator: Frank Sacks, MD
This study addressed the metabolic basis of hypertriglyceridemia and its associated lipid abnormality, dense LDL, a condition that strongly predicts high risk of cardiovascular disease. These lipid abnormalities are growing in prevalence since they are associated with type 2 diabetes and obesity. They found that this protein is integrally involved in the abnormal metabolism of this condition. This is leading toward a new paradigm of lipid related risk of cardiovascular disease, and suggests a new target for diet and drug treatment.

Caveolin-1 and Vascular Dysfunction—Principal Investigator: Luminita Pojoga, PhD
Human phenotype studies were conducted after subjects consumed a high salt (200mmol/day) for 7 days each. Participants were admitted overnight to a Clinical Research Center after the diet and measurements for plasma glucose, insulin, and lipids were obtained in the morning after an 8 hour fast. Study results demonstrated that Cav-1 gene polymorphisms and depletion of the Cav-1 gene are associated with the co-aggregation of insulin resistance and hypertension. These results were recently published in the Journal of Clinical Endocrinology and Metabolism (2011). Dr. Pojoga has received a R01 and Dr. Underwood has received an F32 to investigate the CAV1 gene further.

CHB

CTSU Metabolism and Nutrition Research Services - Available Resources include: nutrition related protocol development, dietary counseling, indirect calorimetry, diet analysis, body composition measurements and a fully operational metabolic kitchen for feeding studies. The Nutrition staff is available to travel to ICUs, medical floors and clinics as well.

CTSU Fast-Track Phlebotomy Service - Availability: in 15 minute increments, Mon & Wed 7:30am to 4:45pm, Tues & Thurs 8 am to 5:45pm, Fri 8am to 3:45pm. For appointment requests less than 48 hours notice please place a phone call to book the appointment at ext. 57861. For appointment requests greater than 48 hours notice please book via e mail C T S U b o o k - i n g@childrens.harvard.edu
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review by only one IRB, all will be considered provided the principal investigator requests it. For research that has previously been reviewed and approved, this form may also be used to request review by a single IRB by adding a new site to an existing protocol. This form should not be used for exemption determinations, which will continue to be made locally and will not be ceded to another IRB.

The Cede Review Form is available through Harvard Catalyst’s portal at: http://catalyst.harvard.edu/services/irbcede/ and the websites of several participating IRBs: http://catalyst.harvard.edu/services/irbcede/participating_institutions.html

To find out more about the form or about multisite research at Harvard in general, contact your home institution’s IRB office.

MGH

The MGH CRC provides services to 123 investigators (including PhD investigators and nurse scientists) on 212 studies. The majority of our studies are conducted at our main facility on White 13 and at our facility on the 2nd floor of building 149 at the Charlestown Navy Yard. In addition, the MGH CRC Nursing and Nutrition staff are available to travel off-unit to conduct research visits. The MGH CRC currently has studies conducted on a number of inpatient units at MGH, as well as at the Simches building, Bowdoin Square and the Chelsea Health Center. Please contact the Nursing Director or Nutrition Director for more information on utilizing off unit resources for your study. We also have a cadre of 5 Nurse Practitioners (NP), and have recently hired a Family NP to support our growing Pediatric Research activity. Our NPs are available to sign MD orders for PhD investigators, help with onsite monitoring, care for participants during visits and admission and discharge orders. The goal of utilizing NPs is to help streamline the visit and help ease the workload of the PI. We have recently renovated an area on White 13 to create space for single blood draws to facilitate blood draw-only visits that can be scheduled on short notice. This will ease the burden on investigators and coordinators and allow such visits to be completed quickly and efficiently.

Metabolism & Nutrition Research support includes the availability of DXA scans for bone mineral density and body composition. For investigators needing nutrient intake data, a comprehensive nutrient database for the calculation of nutrient intake from food records and/or 24 hour recalls can be requested. In addition, treadmill tests may be included as part of studies conducted on the CRC.

MIT

The MIT Catalyst Clinical Research Center has two active cross-instructional studies, one is in the process of analyzing data and the other is preparing to begin.

In the first study, PI Ishir Bhan, MD, MPH, MGH, investigated whether there is any relationship between dietary vitamin D and levels of hCAP18 in the blood. hCAP18 is a protein produced by the immune system designed to help fight infection; recent research has suggested that vitamin D is necessary for the production of hCAP18.

In the new study, investigators Rachel Simmons, MD, Ragon Institute of MGH, MIT and Harvard, and Howard Heller, MD, Chief of Medicine at MIT Medical, will look into host genetics, immunology, and virology of Epstein-Barr virus (EBV). They hope to conduct detailed analysis of the host immune responses of persons identified with acute infectious mononucleosis; of the infecting virus including sequence, gene expression, and miRNA expression; and identify immunological, virological, host genetic and viral factors that influence duration of symptoms, viral load in the blood, and time to EBV seroconversion. The aim is that this study furthers understanding of the immune response to EBV, a ubiquitous virus infecting much of the world’s population, thereby contributing to possible treatments and potentially a preventative vaccine.

In general MITCRC news, Lee Mavros Rushton has joined the as the new administrative director. If you have any questions or concerns regarding the CRC or its use, please feel free to email her at lmavros@mit.edu.
resonates in their oral cavity that distinguishes them, but also the way they pronounce the words."

After Perrachione arrived at MIT, he and Gabrieli decided to try to link this research with evidence showing that phonological processing is impaired in people with dyslexia. They tested subjects in identifying people speaking their native language (English), then Chinese.

When listening to English, the non-dyslexic subjects were correct nearly 70 percent of the time, but performed at only 50 percent when trying to distinguish Chinese speakers. Dyslexic individuals performed at 50 percent for both English and Chinese speakers.

"It's a beautiful study, in the sense that it's so simple," says Shirley Fecteau, a visiting assistant professor at Harvard Medical School and research chair in cognitive neuroplasticity at Laval University in Quebec. "It really seems like a very clear effect on voice recognition in people with dyslexia." Fecteau is also a BIDMC CRC user.

The finding suggests that people with dyslexia may have even more trouble following a speaker than they may realize, Gabrieli says. This adds to the growing evidence that dyslexia is not simply a visual disorder.

"There was a big shift in the 1980s from understanding dyslexia as a visual problem to understanding it as a language problem," Gabrieli says. "Dyslexia may not be one thing. It may be a variety of ways in which you end up struggling to learn to read. But the single best understood one is a weakness in the processing of language sounds."

**Friend versus foe**

Recognizing other members of one's species by their voices is critical for humans and other social animals. "You want to know who is a friend and who is a foe, you want to know who your partner is," Perrachione says. "If you're cooperating with someone for food, you want to know who that person is."

However, it appears that humans and animals perform that task in different ways. Animals can identify other members of their own species by the sounds they make, but that ability is innate and based on the sounds themselves, rather than the meaning of those sounds.

"We notice individual differences in this learned feature of our communication, which is the words that we use, and that's what really distinguishes human communication from animal communication," Perrachione says.

The researchers believe their work may also offer insight into the performance of computerized voice-recognition systems. Voice-recognition programs with access to dictionary meanings of words might do a better job of understanding different speakers than systems that only identify sounds, Perrachione says.

The researchers are now using functional magnetic resonance imaging (fMRI) to determine which parts of the brain are most active in dyslexics and non-dyslexics as they try to identify voices.