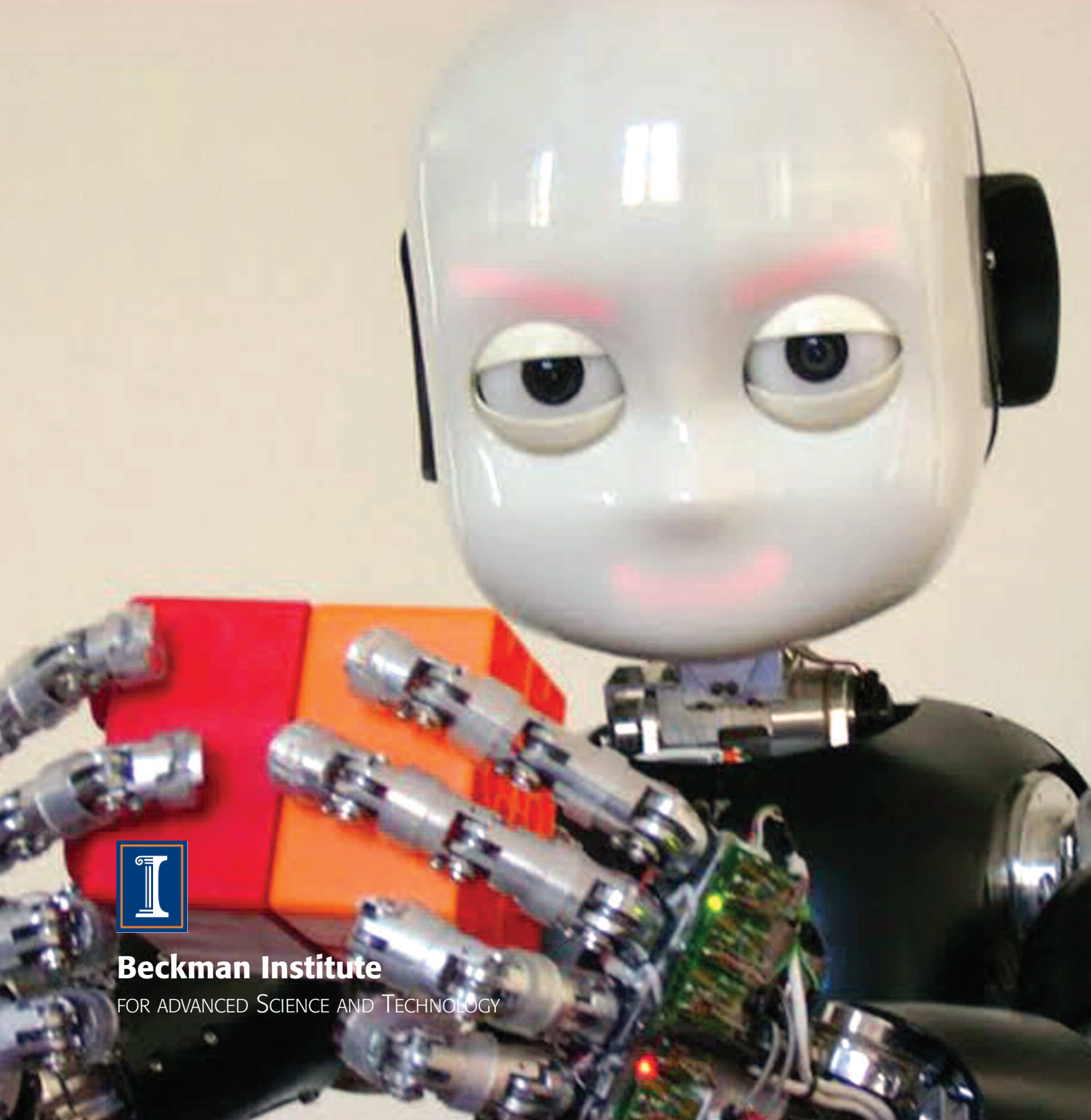
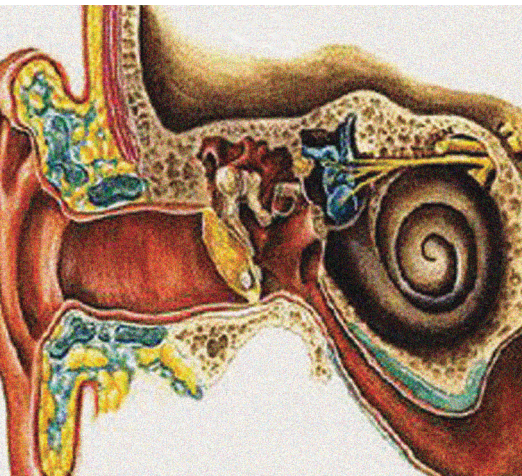
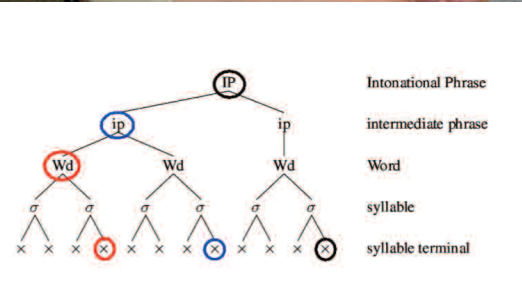


Linguistics and Language Learning



Beckman Institute

FOR ADVANCED SCIENCE AND TECHNOLOGY



Linguistics and Language Learning Research

The areas of linguistics and language learning cut across many disciplines at the Beckman Institute and can encompass fields such as language processing, psycholinguistics (the study of language and psychology), speech and hearing science, neuroscience, engineering, and kinesiology. Beckman researchers studying language investigate topics such as the role phonemes play in becoming fluent, develop new theories of how language is learned, create computational models of speech, and build databases of recorded speech for a number of applications.

Linguistics research at Beckman is intimately bound with technology, both in the use of state-of-the-art equipment like a 3-D articulograph for increasing our knowledge of the acquisition and use of language, and in the development of applications such as automatic speech recognizers, computer-generated avatars, and software programs for learning a second language.

Chilin Shih uses computational modeling, databases, and the articulograph in her work involving second language acquisition and fluency. Shih creates models for prosody that match human perception and production of prosody, toward application in speech technologies like text-to-speech and automatic speech recognition systems, and for teaching languages.

Kay Bock, Mark Hasegawa-Johnson, Brian Ross, and Chilin Shih collaborated on a highly interdisciplinary project for second language fluency assessment that includes the creation of a database of second language learners' speeches. The database has been used to build language learning software that adapts to the needs of individual learners.

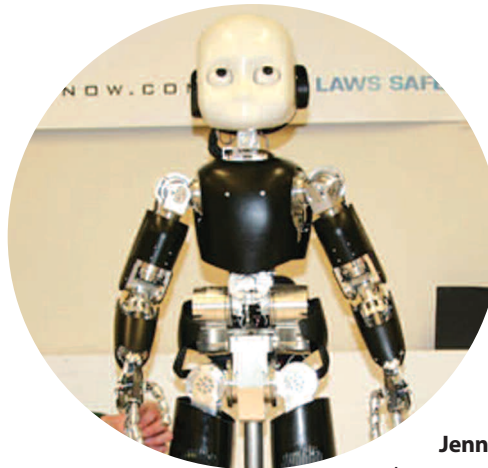
Kay Bock is a psycholinguist and **Neal Cohen** is a psychologist who studies amnesia. Their work integrated language production and acquisition into a new theory of implicit learning that had major implications for how language is learned and how it changes over time.

Stephen Levinson's Language Acquisition and Robotics Laboratory is the only language research group in the world using an iCub, a highly-advanced humanoid robot with the physical dimensions of a human toddler, to study how language is acquired.

Duane Watson investigates prosody, or the aspects of speech such as intonation and pauses that help convey meaning to a listener. Among Watson's research findings is the discovery that speech fillers, such as "um" and "ah" actually facilitate recall for listeners.

Ryan Shosted is a phonologist who studies how phonetic principles shape language. His research involves the aerodynamics of speech, studying the properties of air as it passes through the vocal tract in order to understand the physiology of speech.

Cynthia Fisher and **Dan Roth** combine experimental psychology with computational modeling to provide new insight into how language is acquired and used by young children. Their project seeks to advance knowledge about how children learn their native language and to create protocols for guiding the development of automatic natural language processing systems.



Kara Federmeier's research involving language demonstrated the novel finding that the two hemispheres of the brain work much more in tandem than what was previously thought, and use verbal information differently in the service of language comprehension.

Jennifer Cole focuses on spoken language, trying to understand the elements such as voice inflections and tone that often convey as much meaning as the words themselves. In one project, Cole and **Mark Hasegawa-Johnson** study speech prosody in large speech corpora toward development of an automatic speech recognizer with reduced word error rate.

Charissa Lansing studies how people select and integrate visual and auditory information to process language. She looks at issues such as the visual processes in speech perception, and topics surrounding cell phone use, with translational outcomes involving the development of effective auditory sensory aids like cochlear implants.

Fatima Husain combines computational modeling with neuroimaging techniques like functional Magnetic Resonance Imaging to study auditory, speech, and language processing in the brain. Part of her research is focused on the study of tinnitus, or ringing in the ears.

Torrey Loucks investigates the neural control of speech and voice production as well as neurological disorders in normal and stuttering populations. He currently is focused on the study of adults who stutter (ASW) and specifically differences in the brain between AWS and normally fluent adults (NFA).

Sarah Brown-Schmidt uses eye-tracking equipment and other experimental techniques that allow her to study conversation as it happens naturally. Her work investigating the brain processes behind interactive conversation has shown that in conversational settings people use unclear or ambiguous language a lot more often than would be expected.

Roxanna Girju creates computational models for insight into linguistics, including creating models of text comprehension, with an emphasis on semantic models for textual inference.