SRL NEWSLETTER

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Meet the SRL

Speech Research Laboratory
duPont Hospital for Children/University of Delaware

This is the first Biannual issue of the Speech Research Laboratory Newsletter. The SRL focuses on developing new speech technology and adapting existing speech technology for people with speech and communication difficulties. With this newsletter, we hope to keep people abreast of the latest research and other activities at the SRL.

Who we are…

We are a group of speech researchers housed in the duPont Hospital for Children in Wilmington, Delaware and part of the Center for Applied Science and Engineering of the University of Delaware. Our backgrounds range from computer science to psychology, from engineering to linguistics. For the past six years, we have worked on a number of projects involving the application of speech technology for people with speech related disabilities. We have developed and are still

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ModelTalker:

A Personalized Speech Synthesizer

The ModelTalker speech synthesis system is a state of the art speech synthesizer that has been specifically designed to meet the needs and interests of AAC users. The system provides a personalized voice with recorded natural speech quality for selected utterances and high quality, unrestricted text to speech synthesis in the same "voice" for novel utterances.

How ModelTalker Works:

The ModelTalker System uses an inventory of speech that has been recorded by someone whose voice we wish to emulate. These recordings are stored in a database of speech. Speech is then synthesized from this database using longer stretches of recorded speech for utterances that closely or exactly match speech recordings in the database, and shorter stretches of recorded speech appended together for novel utterances. When speech is synthesized using the longer stretches of recorded speech, the speech has the quality of recorded natural speech. When the speech is synthesized by appending together shorter stretches of speech, the resulting speech sounds like high quality synthetic speech, but will still retain the characteristics of the recorded voice in the database.

Software Programs Associated with the ModelTalker System

Three major software programs are needed to create and use a personalized voice with the ModelTalker synthesizer: the synthesizer itself (ModelTalker); the recording tool (InvTool) used to guide speakers through the process of recording the inventory of

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Clinical Contacts

In March, members of the SRL visited Beth Israel Medical Center in Union Park, New York City, to meet with potential clinical collaborators. We met with Jeri Weinstein, chief of speech/language pathology, Arelette Krauss, and Gary Anderson and his wife. Gary is an ALS patient interested in technological applications.

This was the first of several visits we plan to make to regional clinics to get input on how our software, particularly the software for gathering speech inventories can be designed to best meet the needs of users and the constraints of busy clinical schedules.

Ultimately, we would like to identify clinical collaborators working with clients diagnosed with ALS who would be interested in helping us evaluate the ModelTalker System. The system will be used and evaluated by clients whose voices are still strong. The system requires that clients record an inventory of words and phrases. Clinical collaborators will identify people with ALS who would be interested in recording personalized synthetic voices, assist these clients in recording their voices using software from our Laboratory, and provide both formal and informal feedback to help us improve the system. Clinicians, clients, and their families will be asked to evaluate both the process of creating the voices and their satisfaction with the resulting synthetic voices. Participating clients will be able to keep and use the synthesis software and synthetic voices they create and will receive any future improved versions of the software as well.

Input from our meeting at Beth Israel has already been most helpful in maintaining a focus on crucial factors for both clinicians and users if the ModelTalker system is to be genuinely useful. We look forward to similarly fruitful visits to other clinics in the near future.

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speech; and a program (BCCdb) which is used to create a speech database from the recorded inventory for ModelTalker to use when synthesizing speech.

The synthesizer itself can be thought of as consisting of two components: a user interface; and the speech synthesis application. The user interface is what users see on the computer screen, whereas the synthesizer carries out specific synthesis related tasks like converting text to phonemes and converting phonemes to sound. ModelTalker is designed this way so that different user interfaces can be substituted for the current user interface. For example, many computer-based AAC devices can be thought of as alternative user interfaces which could be connected directly to the ModelTalker synthesizer, bypassing the regular ModelTalker user interface.

What's coming:

Tutorials: With input from clinicians and users, we will be working on tutorial packages that guide users through the entire process of developing a high quality speech database. The tutorials will guide users through the set-up process, system calibrations, and the recording of a speech database, and they will show users some common kinds of problems that are encountered in recording speech and what to do about them.

Wizards: We are in the process of incorporating "wizards" into the InvTool recording program to help point out possible problems in the recorded speech and ways to correct them.

Inventory Design: We are currently determining the effect of different contents and quantities of recorded speech on the quality of the resulting synthesized voices, with the ultimate goal being to select the smallest list that provides high quality speech, allows synthesis of any possible English utterance and leads to user satisfaction.

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CALENDAR OF EVENTS

ACOUSTICAL SOCIETY OF AMERICA

ATLANTA, GA, USA
MAY 30 – JUNE 3, 2000
We will be presenting "Using Markov Models to assess articulation errors in young children".

ISAAC 2000

WASHINGTON DC, USA
AUGUST 2-6, 2000
We will be presenting "Personalized Synthetic Voices for AAC".

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improving a speech synthesis system referred to as ModelTalker. One design goal for this work is to use the latest laboratory techniques without forgetting the desires and constraints of people with communication difficulties.

In addition to application-oriented projects like ModelTalker, the SRL conducts basic research on speech production and perception. We are currently examining how people produce and perceive focus or emphatic stress in speech. Ultimately, we hope this research will help us to make synthesized speech sound more natural and contextually appropriate.

Taking advantage of our location in a children's hospital, the SRL is also studying children's speech. We are collecting a database of children's speech that will include both normal speech and examples of common misarticulations. This can be used to improve automatic recognition of children's speech, and in the development of speech training software for children. Our Star project (*Other Research under way, page 3*) is an example of the latter applicaton in which a believable animated agent will interact with children in a game-like speech training system.❖

Other Research under way…

STAR: Speech Training Assessment & Remediation

The STAR system is a prototype speech assessment and training tool that uses an animated character (named Star) to interact with and encourage children in speech learning and production tasks. These tasks are incorporated into an interactive video game. Star acts as a guide and motivator throughout these games. The system, when completed, will start with basic phoneme recognition tasks, and progress through phoneme production tasks, first in isolation, then in simple and eventually more complex phonetic contexts, and finally in sentences.

At present, there are two activities available in the game. The first is a speech production activity in which a child is asked to produce words and is given feedback (correct or not) after each production. In many cases, words are drawn from minimal pairs which contrast a phoneme to be trained with one the child has already achieved (e.g., *run* versus *won*). Feedback and reinforcement come in the form of responses from Star and other animated characters as well as computer lights. When a child reaches a criterion level of performance of a given set of words, more extended animated sequences are used for feedback and encouragement..

The second activity is one in which children get to build different monsters from monster parts. At present, this

activity is available purely as a diversion from the speech drill activity. Ultimately, a different from of speech drill may be incorporated into this activity as well.

Our goal for the STAR project is to combine the latest technologies involving believable animated agents, speech recognition, artificial intelligence, and speech synthesis to create a speech learning tool that children find enjoyable and easy to work with. A more immediate objective is to provide "take-home" software for children in therapy that will afford speech drill between scheduled clinical therapy sessions and allow STAR's speech analysis and recognition components as well as data logging facilities to provide clinicians supervising speech therapy with valuable adjunct information useful.

SPEECH RESEARCH LABORATORY

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If you are interested in receiving this newsletter in audio format, braille format, or large-print, call us at: (302) 651-6843 or email yarringt@asel.udel.edu

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