

iCanSpeak

Everything is impossible, until it is not

MUGOO
2017-12-11

Speech

- Speech is made a combination of tongue, larynx, teeth, lips, hard and soft palate, nasal cavity, diaphragm, lungs, vocal folds, and the brain
- English uses 45 phonemes for basic sounds
 - Vowels which use open vocal tract
 - 3 Classes of Consonants which restrict vocal tract

Stuttering

- Stuttering/stammering
- Repeated words or syllables
- Prolongation of words or syllables
- Blockage of words or syllables
- Secondary mannerisms

Stuttering

- No known cause, no 'cure'
- Many, many false solutions

Background

- <https://www.nidcd.nih.gov/health/stuttering>
- 5 percent of all children will stutter for some period in their life, lasting from a few weeks to permanently.
- Boys are 2 to 3 times as likely to stutter as girls
- The number of boys who continue to stutter is three to four times larger than the number of girls.
- Most children outgrow stuttering, 1% of adults stutter

My Son - Andrew

- First investigation in 1991 at the age of 5
- Vocabulary of a 10 year old, be patient (80% stop on their own)
- Speech therapy starting at 7 with Jacquee Blum Glance
- Summer program with U of Toronto in 1999 (13)
- Dropped from school support next year, knew more than his therapist
- Continues with therapy and is disfluent in English, French, German

Introduction to iCanSpeak

- Code name for a set of software tools custom written for Andrew Johnson
- Started in 2000, and too far ahead of the technology
- Current technologies made the project possible

iCanSpeak - Vision

- In the short term:
 - To provide technology assistance to people who stutter to make short and long term improvements to their speech fluency with the help of speech pathologists.
- In the medium to long term:
 - To enable research into causes of a range of speech disfluencies that could lead to a cure through partnerships.

The iCanSpeak Idea

- People who stutter don't stutter when:
 - They sing, shout, whisper, swear
 - They choral speak
- The idea:
 - Create technology to simulate choral speaking in real time on an iPhone
 - Altered Audio Feedback (AAF) echoes the speaker's voice with delay and pitch to simulate another speaker
 - Support for shaping exercises with speech therapists

Initial Project

- After U of T course, custom software starting in 2000 for Andrew
 - Written for Macintosh
 - Used in therapy sessions for transference
- 2005 Funding from the Kiwanis Medical Foundation for study of Altered Audio Feedback
- iCanSpeak written on a Compaq iPaq for AAF and tested

Lessons Learned - Keep

- In the tests, it worked!
- In the one hour test, fluency in both reading and conversation improved substantially for all 5 participants
- Daily shaping worked well on a Mac
- Andrew uses the technology regularly through to recently

Lessons Learned - Change

- Not enough battery: iPhone, iPod Touch
- Needed a Mac for exercises: iPhone, iPod Touch
- Voice to text was too complicated: Siri and other programming tools
- Speech therapists: CareKit
- Research options: ResearchKit

iCanSpeak Follow On Project

- Phase 1: Initiation - Identify funders and partners
- Phase 2: iCanSpeak Live - AAF on the fly all day
- Phase 3: iCanSpeak Techniques - Daily speech exercises
- Phase 4: iCanSpeak Care - Add CareKit™ for therapists
- Phase 5: iCanSpeak Research - Add ResearchKit™ for research
- Phase 6: Evangelize and Iterate

Live Module

- Altered Audio Feedback for all day use
- Released as a free app - in App store
- Runs for 6 hours+, in background, locked iPhone
- Runs on an iPod Touch, iPhone 5s, iPad Air

Techniques Module

- Live, plus techniques for daily shaping
- Breathing, Phonemes, Words, Sentences, Choral Reading
- Available for free - submitted to App store

Care Module

- In design now
- iCanSpeak Care: iPad app to allow therapists assignment of shaping exercises
- iCanSpeak Techniques: Functionality to accept exercises from therapist
- CareKit backend: Secure, anonymized backend to handle transfers

Research

- Beginning Planning
- Backend data base setup in conjunction with research partners
- Security Implementation
- Additional data collection tools for iCanSpeak Techniques and iCanSpeak Care
- Observe, publish, iterate

Summary

- iCanSpeak Live and Techniques are modules that would help people who stutter in the daily lives
- iCanSpeak Care and iCanSpeak Research will create a set of tools that therapists and researchers use to better understand the mechanisms of stuttering, and develop better treatments
- Funding from charitable foundations and RKIL
- Looking for volunteers to help test. jamie@iCanSpeak.org

Demonstration

Thanks

- “We are constantly surround by opportunities, masquerading as insolvable problems.” Margaret Mead.
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