Facilitating Communication with Smartphones

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Learning Objectives

1. Participants will be able to identify smartphone tools that facilitate and enhance communication.
2. Participants will be able to identify smartphone apps that facilitate and enhance communication.
3. Participants will be able to identify recent smartphone developments that facilitate communication.
Disclaimer

I have no relevant financial or nonfinancial relationships in the products or services described, reviewed, evaluated or compared this presentation.
Ten Reasons for Inclusion of Smartphones

1. Hearing aids/Implants alone may not be enough
2. Communication Digital Swiss Knife
3. Central part of everyday life
4. Access to communication
5. Apps interact with HA and implant devices
6. Made For iPhone (MFi) (streamers unnecessary)
7. Apps for aural rehabilitation
8. Facilitate communication and repair strategies
9. Improve phone communication
10. Temporary PSAP device (AUD1 app)
<table>
<thead>
<tr>
<th><strong>DAILY EVENT</strong></th>
<th><strong>ASSISTIVE DEVICES</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Wake-up</td>
<td>Alarm clock with vibrator and/or flashing light</td>
</tr>
<tr>
<td>Land lines: home and work</td>
<td>HAC phone, texting, built in amplification, ringer connected to visual or vibrator indicator, speech recognition</td>
</tr>
<tr>
<td>1:1 conversations</td>
<td>Personal communication device (FM or infrared)</td>
</tr>
<tr>
<td>Small group meetings</td>
<td>Portable FM or infrared device placed in the middle of the table, loop, real-time captioning, 1:1 personal communicator</td>
</tr>
<tr>
<td>Noisy restaurant</td>
<td>Personal communication device with directional mike</td>
</tr>
<tr>
<td>Large group meetings, Cell</td>
<td>Large-area infrared, FM or loop system</td>
</tr>
<tr>
<td>phone</td>
<td>HAC phone, vibrate option, texting, high volume output</td>
</tr>
<tr>
<td>Vehicle</td>
<td>1:1 device with directional mike, emergency siren recognizer</td>
</tr>
<tr>
<td>Family dinner</td>
<td>Portable infrared or FM device in middle of table</td>
</tr>
<tr>
<td>TV</td>
<td>Captioning, Infrared, FM or loop connected to TV</td>
</tr>
<tr>
<td>Door bell</td>
<td>Vibrator worn on body and flashing lights</td>
</tr>
<tr>
<td>Child care</td>
<td>Baby monitoring device with vibrating annunciator</td>
</tr>
<tr>
<td>Fire-alarm</td>
<td>Flashing lights and/or vibrating annunciator</td>
</tr>
</tbody>
</table>
Digital Swiss Army Knife

- Mobile/portable
- Volume control/Speaker phone
- Direct Audio Input (DAI)/Loop compatible
- Bluetooth
- Telecoil compatibility/HAC features
- Closed Captioning
- Text communication
- Communication Apps
- Increased audio bandwidth
- Audio, visual, haptic (Vibration) features
- Video conferencing (Skype, FaceTime, Google Hangouts)
- Electronic media (Internet, movies, music, etc.)
United Nations Study

• More people have access to cell phones than toilets
• 7 billion people:
  – 6 billion have mobile phones
  – 4.5 billion have access to working toilets
Fastest Growing Technology

• Smartphones sales surpassed PCs in 2010
• “Mobile broadband uptake is growing at 30 per cent per year, according to the 2013 State of the Broadband report, and will be the fastest growing technology in history.”

Smartphone Adoption

- Almost 2/3 of Americans owned a smartphone in 2013
- Sales of smartphones surpassed feature phones in 2013

Future Smartphones

• “Taking Moore's Law to its extreme conclusion, smartphones should be packing sub-20nm 256-bit, 32-core processors in five years.”

Future Smartphones

- **Augmented Reality (AR):** refers to what is perceive through one’s senses enhanced through computer-generated sensory input such as sound, video, graphics and GPS data.
  - More information is made available by combining computer data to what we see in real life.
- **Example:** Audio-Visual Speech Recognition (AVSR) combines audio, video, and facial expressions to capture speaker’s voice.

http://dx.doi.org/10.1007/s00371-013-0841-1
Future Smartphones

• 3D
• Holographic projections
  – Provide better speechreading cues in 3 dimension?
Future Smartphones

• Ubiquitous, seamless Wi-Fi, everywhere

• Wi-Fi will create cellular-like automatic, ubiquitous and secure Wi-Fi connections, without ever losing a Wi-Fi connection
Future Smartphones

- **Biometric Data**: Transmit hearing aud/implant data-logging information regarding listening conditions, sound sampling, etc., to audiologist
Future Smartphones

- **4G LTE Advanced**: Also known as Long Time Evolution (LTE) Wideband or LTE-A, will deliver data at 150-300 megabits per second (mbps)
  - Up to 20 times faster than current 4G LTE cellular connections
- **HD Voice** (7 kHz bandwidth)
- **Full HD Voice** (20 kHz bandwidth)
Anytime, Anywhere, Anything

- GM and Audi cars to offer "connected cars" 2015
  - GM vehicles integrate with the iPhone or iPad and GM's own OnStar service.
  - Implications for Made for iPhones Hearing Aids

Smartphone Vs. Feature Phone

**Smartphone**: A cellular phone that is able to perform many of the functions of a computer, typically having a relatively large screen and an operating system capable of running general-purpose applications. (Google Online Dictionary)

**Feature Phone**: A mobile phone that incorporates features such as the ability to access the Internet and store and play music but lacks the advanced functionality of a smartphone (Google Online Dictionary)

**Smartphone**: A mobile phone with a touch screen, third party operating system, Internet accessible and used for communication. (Hanavan, 2014)
Phone Vs. Phablet Vs. Tablet

• **Smartphone**
  – Typically varying screen sizes from 3 inches to 5 inches

• **Phablet**
  – Device that combines capabilities of smartphones and tablets, usually larger than a smartphone, but smaller than a tablet

• **Tablet**
  – Device that has a touch screen interface, and usually larger than a phablet
Operating Systems Vs. Applications

- **Operating System** (OS): Software that runs/manages the smartphone computer memory, processes, and all of its application software (apps) and hardware.
  - Android 50.3% U.S. sales, 3Q 2013
  - iOS 43.1%
  - Windows Phone 4.7%
  - Blackberry 0.6%
  - Other 1.3%

- **Application Software** (Apps): Smartphone software that causes the smartphone to perform useful tasks beyond the running of the computer itself.
U.S. Smartphone OS (2014)

TOP U.S. SMARTPHONE OPERATING SYSTEMS BY MARKET SHARE

DURING Q1 2014

- Android OS: 52%
- Apple iOS: 42%
- Windows Phone: 3%
- BlackBerry: 2%
- Others: 1%

Read as: During Q1 2014 an average of 52 percent of smartphone owners in the U.S. used a handset that runs the Android operating system.

Source: Nielsen, Mobile Insights.
Smartphone Adoption in U.S. (2014)

Smartphone Penetration by Age Demo

% by Age Group Who Own a Smartphone

- Age 12+: 61%
- 12-17: 74%
- 18-24: 80%
- 25-34: 79%
- 35-44: 69%
- 45-54: 57%
- 55-64: 48%
- 65+: 25%
Practical Hearing Aid Skills Test-Revised PHAST-R

• Eight tasks on the PHAST-R cover the following skills:
  (1) hearing aid insertion
  (2) hearing aid removal
  (3) opening the battery door
  (4) changing the hearing aid battery
  (5) cleaning the aid
  (6) manipulating the volume control
  (7) telephone use (ranked highest)
  (8) use of the noise program

Wireless – Acoustic Coupling Comparison

- Phone signal transmitted to both ears results in significantly better speech recognition compared to signal to only one ear.

Evaluated HA Telephone Strategies

Research conditions:
- Acoustic telephone w/wo plugging opposite ear
- Unilateral telecoil w/wo plugging opposite ear
- Unilateral wireless streaming
- Bilateral wireless streaming (best)

Mobile Phone Bandwidth

- Compared audible bandwidths
- Significant improvement in phoneme-recognition scores with increased audio bandwidth of 7.5 compared to 3.5 kHz

Internet Telephone Quality

- Internet versus conventional telephone quality
- Speech perception not significantly different than CD quality
- Significantly improved speech perception to hearing-impaired and normal-hearing adults through doubling the frequency range and through conserving audio quality during digital sound processing.

Internet Video Telephony

Internet Video Conferencing:

• Sufficient lip shape information for speech reading by individuals who are deaf and CI users
• Significant audio-visual benefits observed for CI users;

Internet Video Telephony

Skype (CI and deaf subjects)

• Transmits sufficient information for speechreading
• Significant audio-visual benefits observed for CI users
• Speechreading cues available although scores poorer than face to face

4G/LTE

- 4\textsuperscript{th} Generation/Long Term Evolution
- LTE voice (U.S. began implementation 2013)
- If adopted, will there be HD Voice available between calls of various service providers?
- Adoption of Full HD Voice would have positive implications for very high voice quality via cell phones
Smartphone Input to HA/Implant Device

- Audio
  - Earphone or speakerphone
- Magnetic Induction
  - Telecoil Neckloop or Silhouette
- Direct Audio Input (DAI)
  - Adaptors or Cords
- Streamer
- Radio Frequency (RF) Bluetooth
  - Magnetic Induction, DAI, RF (including FM)
SSD/UHL

Mono headset or earplug patch cord
• 3.5 mm mono audio jack for smartphone
• Some streamers use 2.5 mm jack
Accessories for iPhone

DAI patchcords

• 3.5 mm jack for most smartphones and 2.5 mm jack to connect to streamer 3.5 mm jack with either mono or binaural universal 3 pin Euro jack patchcord to connect to HA/Implant
Smartphone Connections to Streamers

- Smartphone
  - DAI
  - Bluetooth
Streamers

- **Bernafon SoundGate 2 and Phone Adapter 2** streamers
- **GN ReSound Unite PhoneClip+** and Resound Control
- **Oticon ConnectLine Streamer Pro** features "mini-mic" neck streamer
- **Phonak Roger Pen** and **Inspiro** wireless microphone transmits to hearing aids via proprietary 2.4 GHz.
  - Wireless transmitter that can stream smartphone audio using Bluetooth 4.0 wideband receiver from Bluetooth devices
- **Siemens miniTek** feature a "mini-mic" streamer
- **Starkey SurfLink Mobile** streamer
- **Unitron uDirect2** features neck streamer
- **Widex WidexLink M-DEX** streamer features audible caller ID in both ears
New Connection Paradigm

Smartphone
(with App)
MFi
Streams audio directly to HA and serves as remote with app

HA, Implant via Bluetooth 4.0
## Bluetooth 4.0 and MFi Hearing Aids

<table>
<thead>
<tr>
<th>Hearing Aid</th>
<th>Model</th>
<th>App</th>
</tr>
</thead>
<tbody>
<tr>
<td>GN ReSound</td>
<td>LiNX</td>
<td>ReSound Smart</td>
</tr>
<tr>
<td>Beltone</td>
<td>First</td>
<td>SmartRemote</td>
</tr>
<tr>
<td>Starkey</td>
<td>Halo</td>
<td>TruLink</td>
</tr>
<tr>
<td>Oticon*</td>
<td></td>
<td>Connectline</td>
</tr>
</tbody>
</table>

* Oticon continues to use streamer with MFi
ReSound Smart App with LiNX

- ReSound LiNX and one or more of the following devices:
  - iPhone 5s, iPhone 5c, iPhone 5, iPad (4th generation), iPad Air, iPad mini, iPad mini with Retina display (running in 2X mode), and iPod touch (5th generation).
  - iOS 7.X or later
  - Optimized for iPhone 5s, iPhone 5c, iPhone 5.
GN ReSound LiNX Smart App
ReSound Smart App (iOS)

The ReSound Smart™ app controls and personalizes hearing experience
First hearing aid app with a direct connection between ReSound LiNX™ hearing aids and iPhone®, iPad® or iPod touch®.

• Adjust volume settings on your hearing aids
• Change manual and streamer programs
• Adjust treble and bass
• Link a program and settings to favorite places
• See battery and connection status
• Stream phone calls, music, audio from videos, movies & games, turn-by-turn directions, FaceTime® conversations, Siri®
• Help locate lost or misplaced hearing aids
ReSound (iOS, Android)(free)
ReSound Steamers)
Starkey Hearing Halo™

• MFi
• Stream calls, FaceTime®, music from iPhone directly to hearing aids using Bluetooth® 4.0 wireless technology
• Remotely control aids with iPhone app
• Help hear comfortably in noise
• Eliminate buzzing and whistling
Oticon MFi

- Oticon’s MFi solution available for all existing and future users of Oticon’s ConnectLine instruments
- iPhone 5
Oticon Hearing Diary App (iOS)(free)
Cognitive/Attention
Mind Builder (iOS) $.99

1B LEVEL 1
Mind Builder
Level 1
If you see a block 'light' up twice in a row, then press the 'Location' button.

Note: In some turns you should not press any button, while in other turns you may need to press more than one button.

Start Level 1

1B LEVEL 1
Performance Statistics
Overall
DIFFICULTY INCREASED!
You played well! Now read the rules because its going to get harder!

Start  Menu
Auditory Verbal (iPad)($3.99)
Neurelec Rehabilitation Game
(iOS/Android)(free)
Hear Coach (iOS)(free)
Cochlear HOPE Words Lite and HD
Cochlear HOPE Words HD(iOS)($1.99)

- Cochlear HOPE program
- Adopted from *Speech Sounds* and *Speech Sounds Vowels*
- Listen to a word and matching their speech production to what they heard.
- Vocabulary development also facilitated
- Each letter of alphabet has twenty different flashcards
Auditory Figure-Ground (iOS)($29.99)
ListenListen Game (iOS) ($1.99)

Choose the Number of Players:

1 2

Then Choose Your Challenge:

- Cartoon Sounds
- Musical Instruments
- Piano Notes
- Horn Notes
- Bass Notes

Make sure the ringer switch is not set to silent and that your ringer volume is turned up.
Sound Match (iOS) free
Weather Alert USA (iOS) ($3.99)
AUD-1 (iOS) ($2.99)
EarTrumpet (iOS)($2.99)

• Medical student developed app for iPhone and iPad which has to enhance and adjust sound to discretely improve hearing experience through earphones provided on your device.

• Developed in collaboration with the Otolaryngology Head and Neck Surgery Department at the University of California, Irvine.
Siemens Hearing Test (iOS)(free)
Ling 6 (iOS)(Android)(free)
Too Loud (iOS)(free)
Sound AMP R (iOS)($4.99)
EARs (iOS) ($3.99)
SoundPoint (iOS)(free)
Hamilton Mobile WebCapTel (free)
Wireless CapTel by Sprint (free)

Hello Carol speaking. Hi Ted I’m good how about you? That’s very cool about a new app. It sounds wonderful! I’m glad you are saving on your monthly wireless bill and can now place calls anywhere with Wireless CapTel by Sprint!

This is what your captions will look

Font Type Arial
Font Size 36
Font Color Green
Background Black

Restore
IP-Relay (iOS)(free)
Purple P3 (Android/iOS)(free)
SorensonVRS (free)
Ntouch (VRS/VCO)(iOS/Android)(free)
ClearCaptions (Android/iPhone)(free)
AuditoryVoIP (iOS) $4.99

• Users can choose preferred sound quality and volume from various default settings
• The technology is specifically optimized for the frequency range of a telephone signal“
• Compatible with iPhone 4, iPhone 4S, iPhone 5 or iPod™ touch
  Note: AuditoryVoIP require a paid account with an SIP provider
• Compatible with iOS 6. Functionality in iOS 7 is not guaranteed. (An iOS 7 compatible version is in progress.)
Tap Tap (iOS) ($2.99)
Myeardroid (Android)(free)

Training of your background:
- Background sound

Training and selection of your sounds:
- Telephone
- Doorbell
- Alarm
- Alarm Clock

Training - Doorbell
I would need to record your own sound to train the app. Please wait 5 seconds and after make it sound until the training process is completed.

Latest detected sound:
- Doorbell

Analyzing...
Z5 Mobile (Android/iOS)(free)
Netflix (iOS)(Android)(Windows)(free)
Netflix Subtitles

iPad, iPhone, iPod Touch

Note: Subtitles and captions on iOS devices can be customized from within the Settings menu in iOS.

To enable subtitles and alternate audio on your iPad, iPhone, or iPod Touch:

1. During playback, tap anywhere on the screen.
2. Select the Dialog button ( ) in the upper right corner.
3. Select your preferred audio or subtitle options.
4. Tap Done.

Subtitles settings in iOS7 may be impacted by the device settings. You can change these options by:

1. Select settings
2. General
3. Accessibility
4. Subtitles & Captioning
5. Style
6. Select preferred option

Enable and customize subtitles and closed captions:

Closed Captions + SDH must be enabled from the iPad, iPhone or iPod Touch menu under Settings > General > Accessibility > Closed Captions + SDH before they can be enabled in the Netflix app.

You can then customize the appearance of subtitles and closed captions on your iOS device by going to Settings > General > Accessibility > Subtitles and Captioning > Style. To ensure Netflix displays your new customized subtitles, make sure Video Override is turned off from within font, size, color, and opacity.
TED Talks with TEDiSUB (free)

Summary

Stress. It makes your heart pound, your breathing quicken and your forehead sweat. But while stress has been made into a public health enemy, new research suggests that stress may only be bad for you if you believe that to be the case. Psychologist Kelly McGonigal urges us to see stress as a positive, and introduces us to an unsung mechanism for stress reduction: reaching out to others.

Kelly McGonigal
TuneWiki (iOS)(Windows)(Android)(free)
Lyrics Lite (Android/iOS)(free)

Titanium
By Sia, David Guetta
From the album: Nothing But the Beat
You shout it out
But I can't hear a word you say
I'm talking loud not saying much
I'm criticized but all your bullets ricochet
You shoot me down, but I get up
I'm bulletproof nothing to lose
Fire away, fire away
Ricochet, you take your aim
Fire away, fire away
You shoot me down but I won't fall, I am titanium
You shoot me down but I won't fall

Imagine Dragons
Night Visions (2012)
1 Radioactive 3:06
2 Tiptoe 3:14
3 It's Time 4:00
4 Demons 2:57
5 On Top of the World 3:12
6 Amsterdam 4:01
7 Hear Me 3:55
8 Every Night 3:37
9 Bleeding Out 3:43
10 Underdog 3:29
11 Nothing Left to Say/Rocks 8:56
SoundHound
Windows/Blackberry/iOS/Android (free)
Speak It (Android)(free)
Virtual Voice (Android)(free)
iSpeech Translator (All)(free)

Where do you want to go to dinner tonight?

¿Dónde desea ir a cenar esta noche?
Hi John, call me when you get this e-mail. I'm running a little bit late.
Mobile Skype
(Android/iOS/Blackberry/Windows)(free)
Google Hangouts (Android/iOS)(free)
FaceTime (iOS)(free)
Cochlear BAHA Support

**Baha® 3 Sound Processor (BP100)**

- GENERAL
- ADJUSTING
- BATTERIES
- CLEANING
- TELEPHONE
- TRAVEL
- MRI
- INCIDENTS
- TROUBLESHOOT

**GENERAL**

- Basic rules

**INSTRUCTIONS**

- Turning your sound processor on and off
- Attaching your sound processor
- Removing your sound processor
- Reading status indicators – LED lights and beep sounds
- Testing your sound processor
- Changing colours or moisture barriers
- Using a tamper-proof battery

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Questions/Comments