Roger Dynamic SoundField & Roger Focus

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Can You Decipher This?

I cdnuolt blveiee taht clued sulltety uesdnatnrd walt I was rدنigt. The phmomneal pwoer of the hmuan mind. Accdng to a rscheearch at Cmabridge Uinervtsy, it dtosnt mttter in whdh ordr tht llterrs nw or dwn or wdh spced sntnt or if ths frist sntnt is sd in frst the rght pclae. The rsult can b a tcot ms and yu cn stll rsd it woult b a pblm. Ths is bcs use the huamn mdn dsos nd rds erve ylter b ystlf, b t wuld s a whl. Amznig huh? yehh and I wlyas tghuhot slpling was ipmornt!

The challenges of understanding

- Meaningful education requires that children can hear their teachers well
- Children with hearing loss face challenges in classrooms, which can be very noisy
- Extensive studies* have shown that hearing instruments alone are often not enough and that intelligent solutions are needed
- FM has been the typical solution

### A history of firsts for the classroom

<table>
<thead>
<tr>
<th>Year</th>
<th>Product</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>MicroLink</td>
<td>The first miniaturized ear-level FM receiver</td>
</tr>
<tr>
<td>2000</td>
<td>MLx</td>
<td>The first universal ear-level FM receiver</td>
</tr>
<tr>
<td>2003</td>
<td>Multi-frequency FM</td>
<td>The first frequency-flexible FM system</td>
</tr>
<tr>
<td>2007</td>
<td>Dynamic FM</td>
<td>The first adaptive FM system</td>
</tr>
<tr>
<td>2013</td>
<td></td>
<td>The first to use adaptive digital wireless transmission at 2.4 GHz</td>
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</tbody>
</table>

### Have You Met Roger?

Roger is the new digital standard that uses 2.4 GHz technology. It bridges the understanding gap, in noise and over distance, by wirelessly transmitting the speaker’s voice directly to the listener.
Why the name Roger?

- Roger comes from aviation
- It means message received and understood

What is Roger?

- Roger is a new digital wireless technology standard that replaces FM
- Allows for low delay and reliable long-range broadcast to miniature, low-power receivers
- Operates on 2.4 GHz band (ISM), with intelligent adaptive protocols
- Audio bandwidth up to 7300 Hz
- Privacy is guaranteed

Roger Dynamic SoundField

- Classroom noise is not only a problem for students with hearing difficulties.
- It can also make understanding the teacher difficult for children with normal hearing
  - APD
  - ADHD
  - Autism
  - second language learners

- Roger Dynamic SoundField offers the same stunning sound quality as today’s Dynamic SoundField system, but it is now also compatible with Roger ear-level receivers
- Guaranteeing all children can enjoy Roger levels of speech intelligibility.
**Roger DigiMaster 5000**
- Adaptive behavior
- One DigiMaster 5000 per classroom
- Microphones: Roger inspiro or Roger inspiro SoundField
- Options: Roger DynaMic, Roger AudioHub
- For normal-sized classrooms: 100 m² / 1076 ft² and more
- Floor stand or wall mounted
- 12-loudspeaker array
- Audio input

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**Roger DigiMaster 5000 placement**

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**Roger DigiMaster 7000**
- 15 loudspeakers in an array
- Adaptive behavior
- Up to Two DigiMaster 7000s per room
- Microphones: Roger inspiro or Roger inspiro SoundField
- Options: Roger DynaMic, Roger AudioHub
- For larger rooms up to 300 m² / 3230 ft²
- Floor stand or wall mounted
- Audio input

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Ideal positioning

Roger DigiMaster 7000 placement

Roger inspiro
- Roger inspiro - recommended classroom solution
  - FM
  - Roger
  - SoundField
  - DigiMaster x
  - Audiohub
  - DynaMic

Dynamic SoundField - Overview | Phonak - life is on
Benefits for students

- Improved sentence recognition ability
- Increased student attention, interaction and participation
- Quicker acquisition of reading, writing and numeracy skills
- Easier deciphering of language in early learning years
- Better understanding of teacher for non-native speakers
- Expanded seating options for students with attention deficit issues

Benefits for teachers

- 100% of teachers identified a decrease in vocal strain and fatigue as a key personal benefit of using a soundfield amplification system
  - Teacher absences due to vocal strain and voice fatigue decreased from 15% percent to an average of 2-3% in one year (MARRS, 2005b)
- Aids class instruction and management
- Fewer discipline problems through improved voice-control of students
- Less stress
- Improved in-class mobility
What teachers say about Roger Dynamic SoundField

“When I forget to turn it on the students are quick to remind me. I think Roger Dynamic SoundField is the best system I have had the opportunity to use in my 20 years of teaching.”

Sarah Daoust, elementary school teacher, Michigan, USA.

Roger SoundField Research

Dynamic SoundField research overview

<table>
<thead>
<tr>
<th>Topic</th>
<th>Researcher</th>
<th>Place</th>
<th>More Information In</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher benefits</td>
<td>Brent Tustin</td>
<td>New Zealand</td>
<td>Field Study News</td>
</tr>
<tr>
<td>Performance</td>
<td>Felix Goldbeck</td>
<td>Switzerland</td>
<td>Field Study News</td>
</tr>
<tr>
<td>Clickers</td>
<td>Debi Vickers</td>
<td>London</td>
<td>Publication</td>
</tr>
<tr>
<td>Acoustics</td>
<td>Bradford Bates</td>
<td>London</td>
<td>Publication submitted</td>
</tr>
<tr>
<td>Performance &amp; FM</td>
<td>Jace Wolfe</td>
<td>Oklahoma</td>
<td>Presentation, publication expected</td>
</tr>
</tbody>
</table>
Latest soundfield research by Jace Wolfe

• Compare Dynamic SoundField versus a fixed-gain, soundfield system utilizing four loudspeakers strategically placed in the classroom
• In quiet and in noise
• With normal hearing listeners and listeners with a hearing loss
• Children and adults
• Comparisons:
  - Dynamic SoundField → Dynamic SoundField + Personal FM
  - Fixed-gain, multi-loudspeaker soundfield → Fixed-gain, multi-loudspeaker soundfield + Personal FM
  - Personal FM alone

Main inclusion criteria

• Normal hearing children
  - 5 to 13 years old
  - No reported history of language, processing, or attention disorders
• Normal hearing adults
  - 18 to 50 years old
  - No history of significant otologic disorders
• Children with hearing loss
  - 5 to 13 years old
  - Four-frequency pure tone average between 35-75 dB HL
  - Full-time hearing aid users
  - At least 60% correct on age-appropriate monosyllabic word recognition test
  - Spoken language aptitude within one year of chronological age

Subjects

• 15 Children with Hearing Loss
  - 6-13 years old
  - Mean Age: 9.5 years old
  - 4FPTA Range: 35 to 68.75 dB

• 15 Children with Normal Hearing
  - 5-12 years old
  - Mean Age: 8 years old

• 10 Adults with Normal Hearing
  - 18-48 years old
  - Mean Age: 34 years old
Subjects wore a variety of behind-the-ear hearing aids.

Audio Enhancement Elite II
Classroom Audio Distribution System

Infrared Dome Sensor
Four W509 Wall-mounted loudspeakers

Classroom Setup: dimensions
Background noise levels
- Classroom noise was presented from the four loudspeakers in the corners of the room.
- Tested in:
  - Quiet & Noise at
    - 50 dB(A)
    - 55 dB(A)
    - 60 dB(A)
    - 65 dB(A)
    - 70 dB(A)
    - 75 dB(A)

Positioning of loudspeakers

Presentation level of HINT sentences
- HINT sentences presented at 85 dB(A) to microphone.
- HINT sentence level at the subject was 64 dB(A).
The output of the Phonak DigiMaster 5000 was set to the automatic default setting. This resulted in the HINT sentences being presented at 68 dB(A) at the subject location.

The gain of the Elite II was set to provide an equivalent level in quiet at the subject location.

Test Conditions

- No soundfield or personal FM
- Roger Dynamic SoundField alone
- Audio Enhancement Elite II alone
- Roger Dynamic SoundField + Personal FM
  - Roger inspiro to DigiMaster 5000 and Personal FM
- Audio Enhancement Elite II + Personal FM
  - Roger inspiro connected to audio output port of Elite II
- Personal FM alone
  - Roger inspiro to personal FM

Results: speech recognition without soundfield or personal FM
Results

- Adults understand speech in noise better than children
- Children with normal hearing understand speech in noise better than children with hearing loss
- The difference between groups becomes greater at higher noise levels
- All groups experience more trouble in noise (60, 65, 70, & 75 dB(A)).
  - Performance became progressively poorer from 60 to 75 dB(A)

Normal hearing adults with soundfield

Results

- Soundfield improve adults’ speech recognition in noise at noise levels of 65, 70, and 75 dB(A)
- Roger Dynamic SoundField provided better speech recognition in noise than Audio Enhancement Elite II system at 70 and 75 dB(A)
Results

- Soundfield improves speech recognition in noise of children with normal hearing at noise levels of 60, 65, 70, and 75 dB(A).
- Roger Dynamic SoundField provided better speech recognition in noise than Audio Enhancement Elite II system at 70 and 75 dB(A).
Results

- Soundfield improves speech recognition in noise of children with hearing loss at noise levels of 60, 65, 70, and 75 dB(A)
- Roger Dynamic Soundfield provided better speech recognition in noise than Audio Enhancement Elite II system at 70 and 75 dB(A)

### Soundfield performance across groups

<table>
<thead>
<tr>
<th>% Correct</th>
<th>Noise Level (dBA)</th>
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<tbody>
<tr>
<td></td>
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### Soundfield ↔ Soundfield + Personal FM

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</table>
Results

- Personal FM better than no FM at all noise levels.
- Personal FM better than soundfield at 60, 65, 70, and 75 dB(A)

Roger Dynamic SoundField + Personal FM vs Personal FM alone

- No difference in performance between soundfield + personal FM versus personal FM alone.

Children with Hearing Loss

Soundfield + FM vs Personal FM

- No soundfield nor personal FM
- Phonak Dynamic + Personal FM
- Personal FM Only
- No difference in performance between soundfield + personal FM versus personal FM alone.
Results

- Roger Dynamic SoundField + personal FM and personal FM alone are both better than Audio Enhancement soundfield + personal FM at 60, 65, 70, and 75 dB(A)

Possible causes of decreased speech understanding

- Loss of adaptive (Dynamic) signal
- Loss of noise pre-processing at inspiro
- Insufficient input from audio output of the other CAD to inspiro
- Antenna in FM inspiro

AAA guideline states:

5.2.3. Coupled ADS and Personal FM Verification

"Because of potential undesirable variables when interfacing a classroom ADS and personal FM system, the connection of the personal FM Transmitter to the audio output of the ADS is not recommended. The teacher should wear two microphones, one for the personal FM Receiver(s) and one for the ADS (parallel signal processing). Alternatively, the teacher may wear a transmitter that directly serves both the personal FM Receiver(s) worn by the student(s) and an FM Receiver that provides input to the ADS (sequential signal processing)."
**Conclusions/Clinical Implications**

- Adults understand speech in noise better than children.
- Children with NH understand speech in noise better than children with HL.
- Soundfield improves speech recognition in noise for all subjects.
- Dynamic SoundField provides better speech recognition in noise than fixed-gain soundfield.
- Personal FM provides the largest improvement in speech recognition in noise.
- Phonak Dynamic SoundField + Personal FM provides better performance in noise than AE Elite II + Personal FM.
- Little to no speech recognition in noise improvement with Phonak Dynamic SoundField + Personal FM vs. Personal FM alone.
  - But soundfield may improve classroom acoustics in real world.
Roger Focus

- Unilateral hearing loss
- Minimal hearing loss
- Auditory processing disorder
- ADHD
- Autism
- Dyslexia

Zero hassle and full compatibility

Focus on fun
Roger Pen
- Easily access other talkers in the classroom
- Student can have control of microphone

Focus on flexibility
- Roger Microphones and Focus

Roger Pen in detail
- Mic mode
- Connect
- On/Off
- Bluetooth for smart phone connection
The Roger Pen features an accelerometer

- An accelerometer is a small mechanical and electronic component that measures accelerations in three dimensions (X, Y and Z)
- The accelerometer continuously informs the Roger Pen about its orientation with respect to the direction of gravity to choose a microphone mode automatically
- It also tells the Roger Pen when it is accidentally dropped
- Smart phones use accelerometers for instance to rotate pictures to avoid they are ever displayed upside down

Automatically chooses microphone mode

- Lanyard - Useful for listening to one single talker (teacher)
- Conference - Place flat on the table to listen to several talkers (group work)
- Interview - Point in the direction of the talker (students asking questions)

Listening to Multimedia via the Audio Cable or docking station

- Instant broadcasting of audio signal when audio is played
  - Microphones are muted
  - Use audio cable to plug into headphone jack of computer
  - Connect docking station to smart board, media, etc.
Roger Clip-On Mic in detail

Maximum performance: Roger Focus evidence

Speech-in-noise testing revealed an average improvement of 53% with Roger Focus compared to no device.

N=15  BKB-SIN, -5dB SNR, noise at 65dBSPL

Subjects 2, 4, 12, and 14 scored 0% without any device and almost 100% with Roger Focus.

Note: with the exception of subjects 3 and 9 all individuals scored a significant improvement.

THANK YOU & QUESTIONS?