



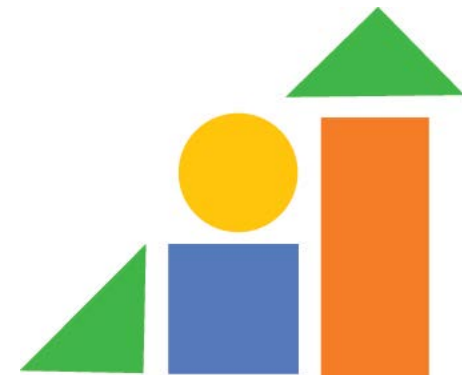
FM Systems and Wireless Technology

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Learning Objectives

1. Learn what an FM system is and how it works
2. Understand how FM systems help in different settings
3. Learn how wireless hearing technologies work
4. Discuss some of the most common wireless technology devices used among children with hearing loss



Research Studies

“Parents tend to talk more with their children when wearing an FM system, and children will imitate... sounds more often”

“Some children wearing FM systems regularly at home, showed an improvement in speech and language development”

(Benoit, 1989; Moeller et al., 1996)



Source: Phonak Pediatrics

What is an FM system?



Source: Phonak Pediatrics

Who Benefits

- Any child in ANY group situation
- Any child in ANY situation with:
 - background noise
 - where they are receiving new information
 - where the speaker moves around the room
- Any child who has ANY distortion in their hearing
- Any child who has poorly developed language structure

How does an FM system work?

1 Speaker – microphone

2
Speaker - transmitter

3
Receiver – child with
hearing aids or CIs



Types of FM systems

Personal FM systems

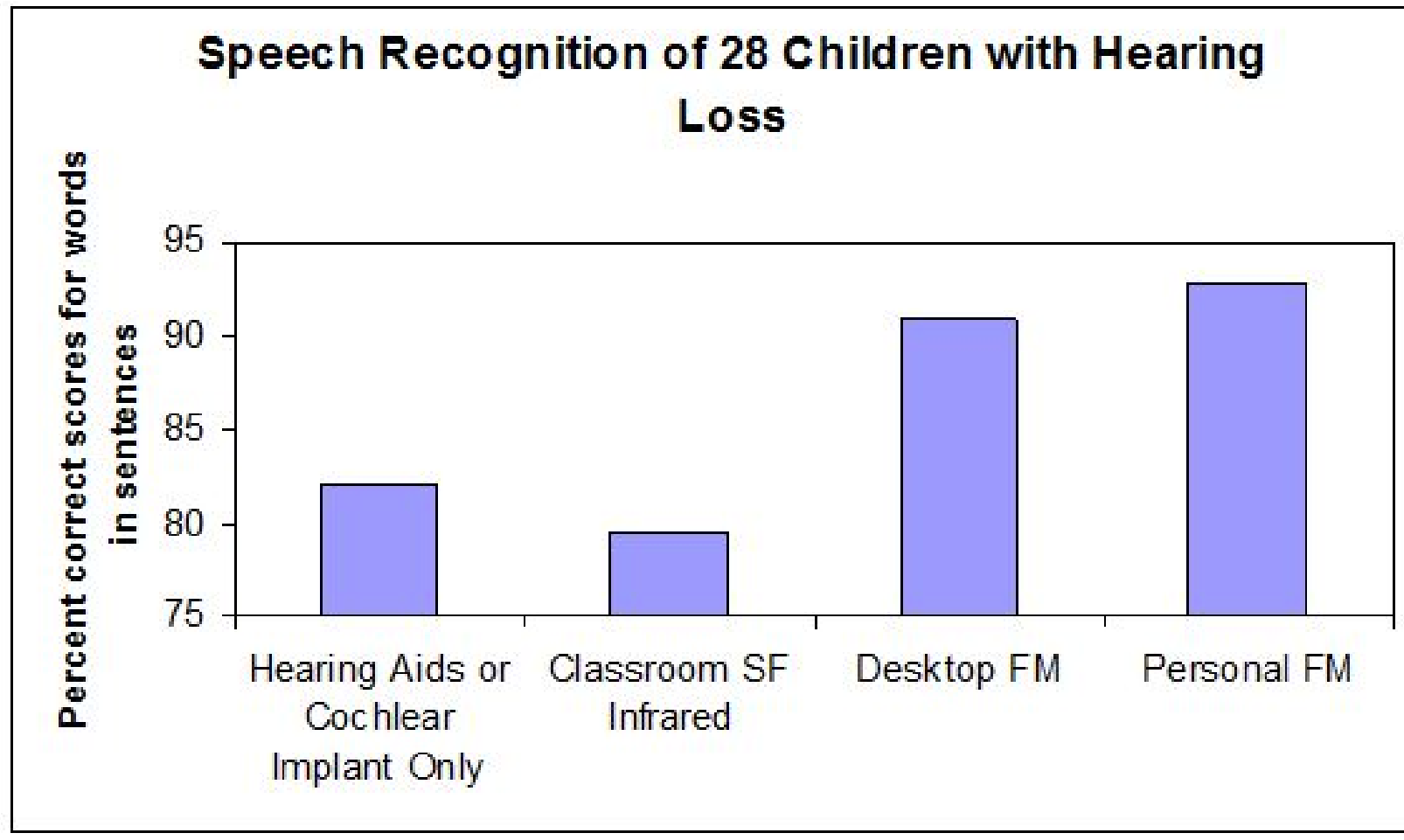
- The “FM transmitter” picks up the desired signal from the microphone (often the speaker’s voice) and sends the signal by radio waves to the “FM receiver.”

Soundfield FM systems

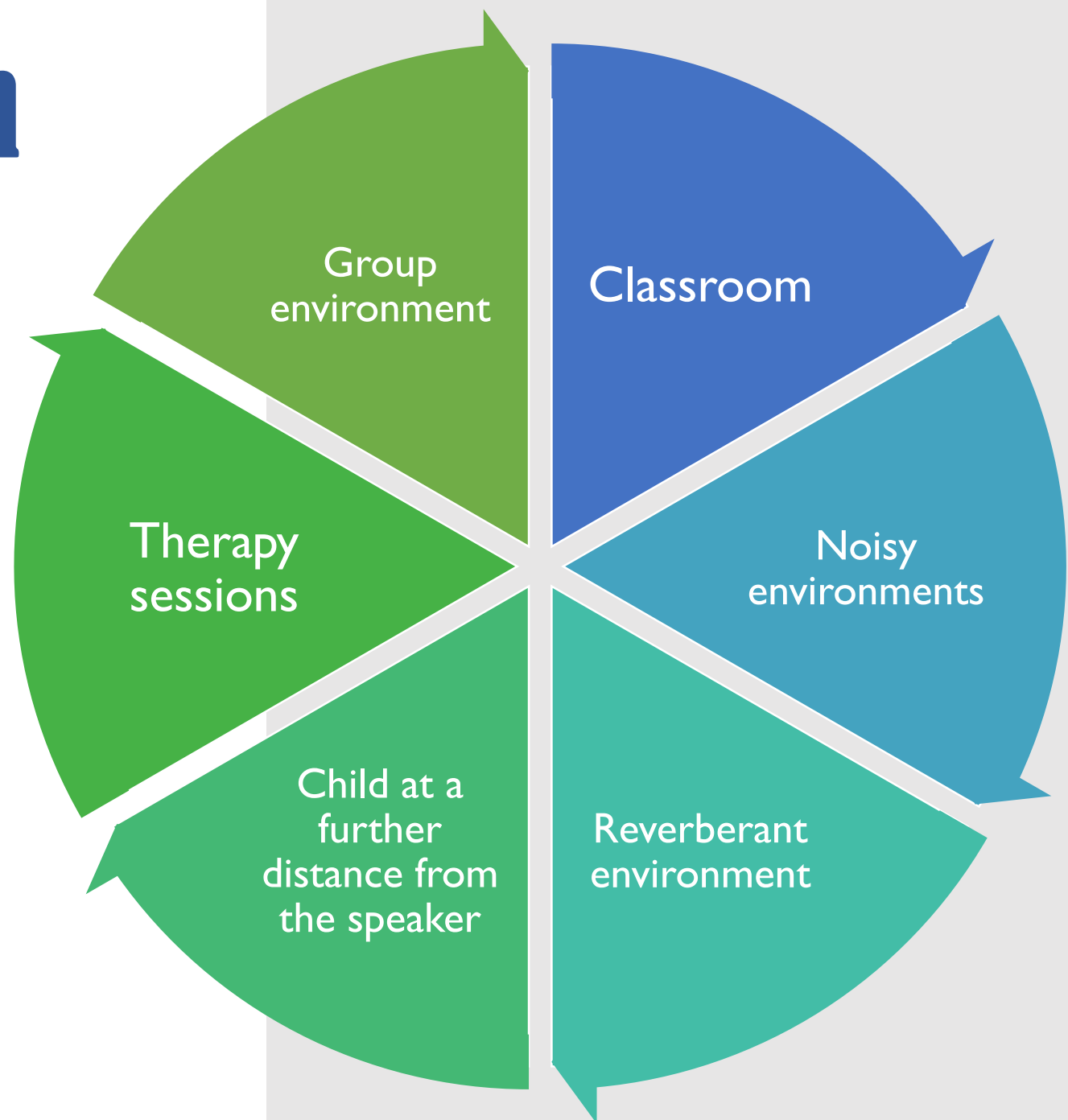
- The teacher wears a microphone and speakers are placed in the classroom.
- The teacher’s voice is able to be amplified louder and above the noise level of the classroom, throughout the whole room.

Personal FM systems are recommended over Soundfield FM system for children who have hearing loss or auditory processing disorder.

Personal FM Systems vs Soundfield Amplification



When to use an FM system?



Video: Hearing Loss in the Classroom

Hearing Loss In The Classroom



https://youtu.be/RBrnvGKLF_Q

DM (Digital Modulation) vs. FM (Frequency Modulation)

DM

- Robust & Steady Signal
- Wider Bandwidth (100-7000 Hz)
- Utilizes instructions/guidelines to replicate signal (recipe)
- All or nothing signal

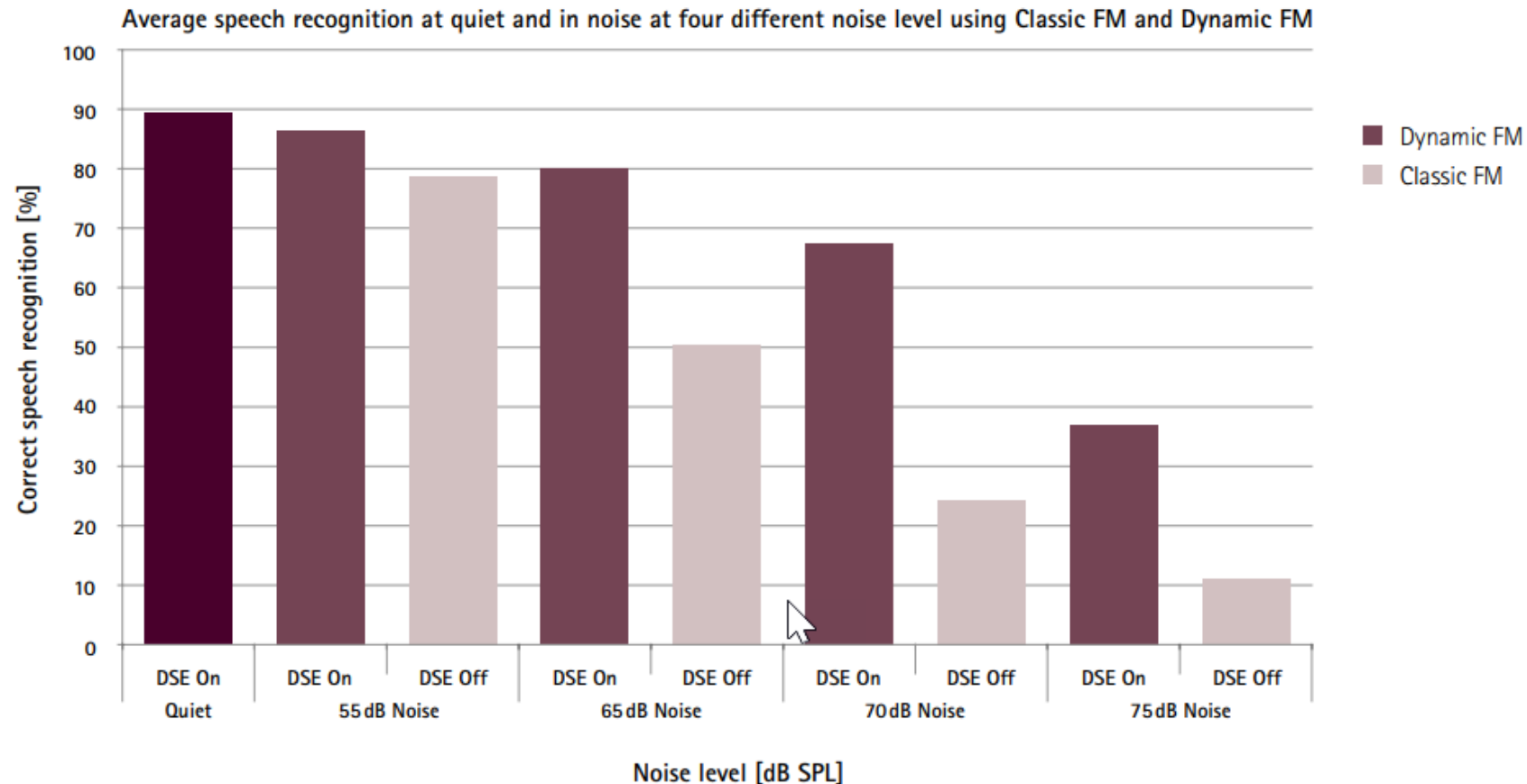
FM

- Dropped signal
- Interference with channels
- Less Bandwidth
- Utilizes an image of the sound to replicate it (Photocopy)
- Distortions & replications that aren't good copies

Bielski, B. (2015) What's the difference between frequency modulation in FM systems and digital modulation?

<https://www.audiologyonline.com/ask-the-experts/what-s-difference-between-frequency-13187>

DM (Digital Modulation) vs. FM (Frequency Modulation)



Speech recognition in noise for recipients of Advanced Bionics Corporation implants, Cochlear implants and MED-EL implants, at four different noise levels using Classic FM and Dynamic FM (combined results from Wolfe et al. 2009 and Goldbeck et al. 2009)

Benefits of using an FM system

Reduces background noise



Improves communication



Benefits of using an FM system

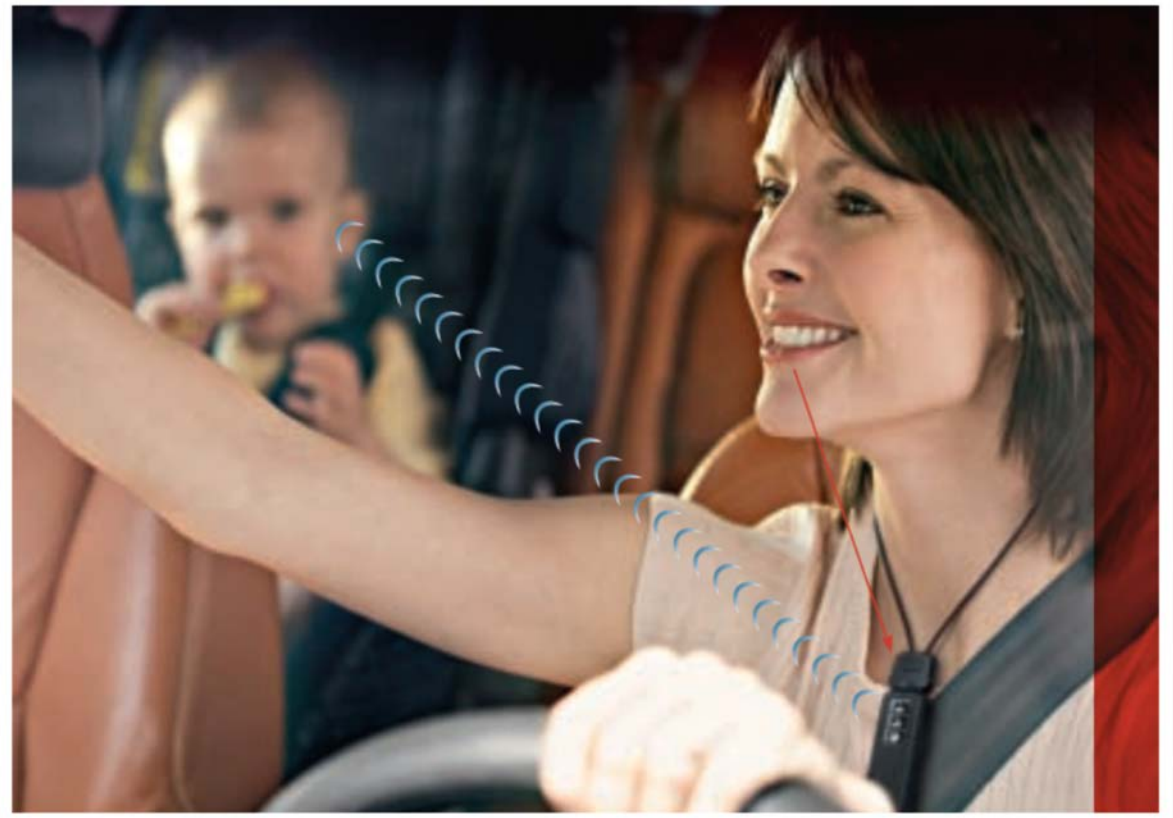
Increases sports' participation



Increases academic performance



Improves communication in the car



Factors that affect a child's hearing

Background noise

- FM system— reduces background noise

Distance from the source (speaker)

- FM system— decreases the distance from the speaker

Reverberation (echo)

- FM system – decreases the echo in the classroom

FM system Advantages

1. Increases access to speech
2. Eliminates feedback from the hearing aids
3. Provides full access to the caregiver's voice
4. Increases participation in school and extracurricular activities
5. Increases incidental learning



FM Systems Styles

Oticon - AMIGO

Oticon • Amigo



Amigo T10
Personal Transmitter



Amigo T20
Educational Transmitter



Amigo T21
Team Teaching Transmitter



Amigo R1
Universal Receiver
Multi-Channel



Amigo R2
Universal Receiver
Multi-Channel w/
Channel Switch



Amigo R7
Dedicated Receiver
for Sumo models

Source: Oticon Pediatrics

Phonak - INSPIRO



Source: Phonak Pediatrics



Roger Touchscreen Mic



Roger Pass-around



Roger Pen



Roger Clip-On Mic
Roger Multimedia Hub



WIRELESS TECHNOLOGY PHONAK ROGER



Wireless Technology

OTICON: Streamer – Mini Mic – TV adapter



Source: Oticon Pediatrics

Phonak: ComPilot-Mini Mic – TV adapter



Source: Phonak Pediatrics

Resources

1. Phonak:

<https://www.phonak.com/us/en/hearing-aids/hearing-aids-for-children/hearing-aids-for-toddlers.html>

2. Oticon:

<https://www.Phonak.global/solutions/accessories/amigo-fm>

3. FM Solutions for Cochlear Implants

http://www.phonak.com/content/dam/phonak/b2b/C_M_tools/FM/Receivers/Brochures/028-1061-02_GB_FM_CI.pdf

4. Hearing Loss at School: <https://youtu.be/Fa6qFiQKpxU>

5. Hearing Loss in the Classroom: https://youtu.be/RBrnvGKLF_Q

6. Hearing Aid – FM Simulation Captioned Version: <https://youtu.be/JNzxOJKCUug>

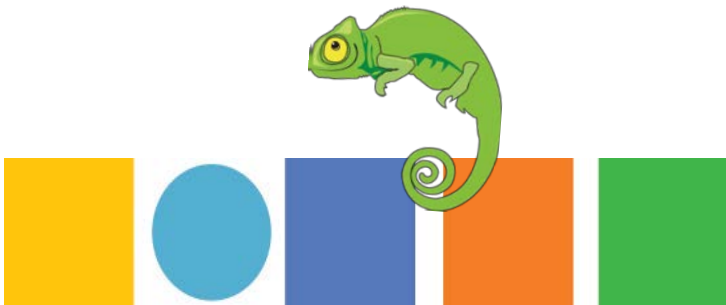


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[Questions and Comments](#)

