

Dual Sensory Loss: Facts, Assignment Project Exam Help Rehabilitation, and Research

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Perceptual Issues in Visual Impairment

Outline

Interactions between Vision and Hearing

- *Think about how our senses work independently/interactively in our daily life.*

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An Introduction to Dual Sensory Loss

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Rehabilitation for Dual Sensory Loss

Sight, smell, hearing, taste and touch



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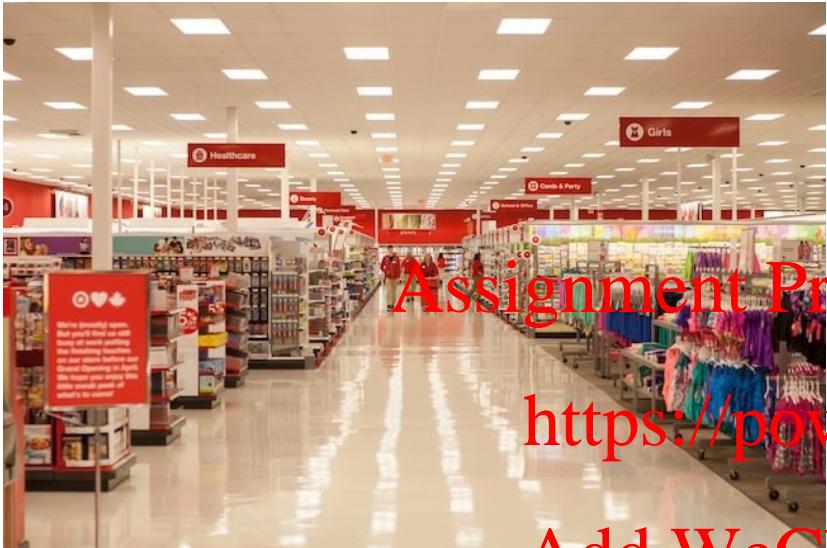
Sight, smell, hearing, taste and touch



Sight, smell, hearing, taste and touch



Spatial Processing



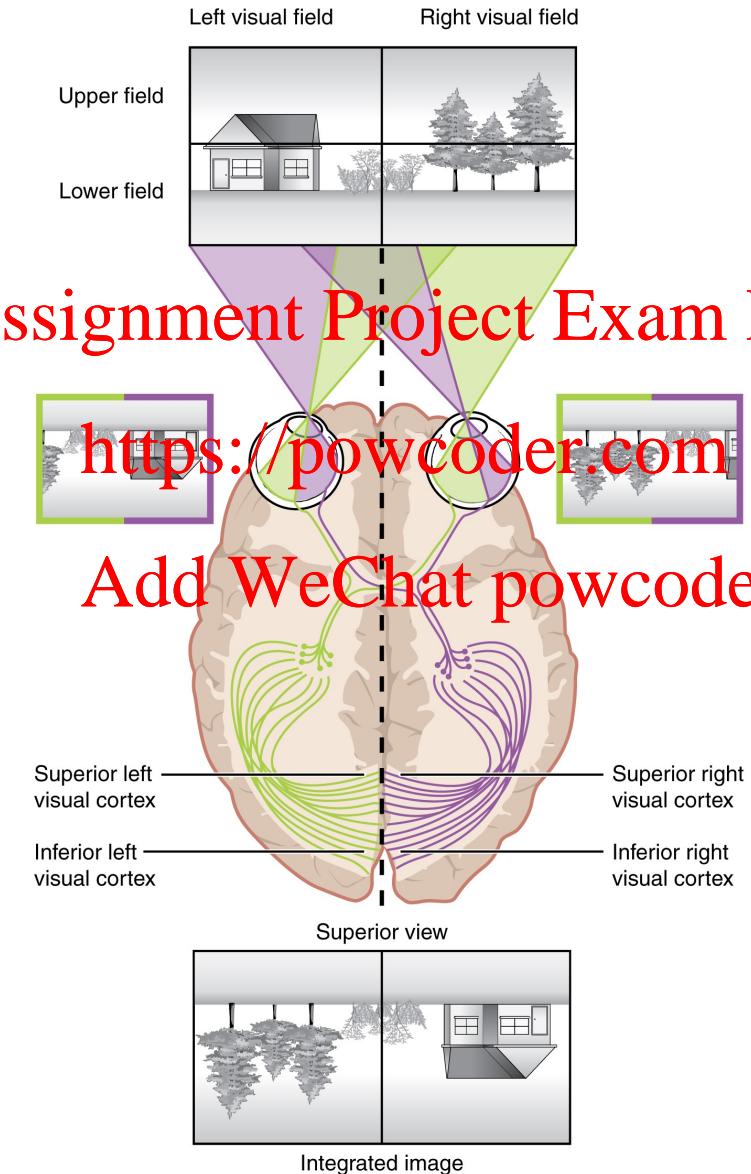
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Spatial Localization: Vision

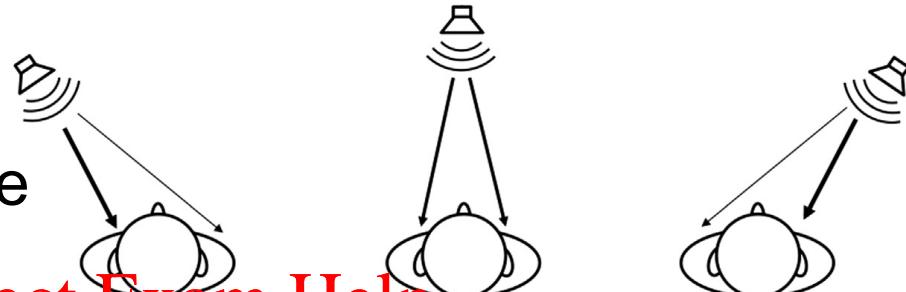


Spatial Localization: Hearing

Horizontal localization

Interaural time difference

Interaural sound level difference



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Vertical localization

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Monaural spectral cues

generated by the modification of a sound by the torso, head, and the outer ear.



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Spatial Processing: Vision Dominates Hearing

Ventriloquist Illusion



Ventriloquist effect in multisensory research

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Question: Can you think of any real-life examples when vision and hearing are from different locations?

Speech Perception

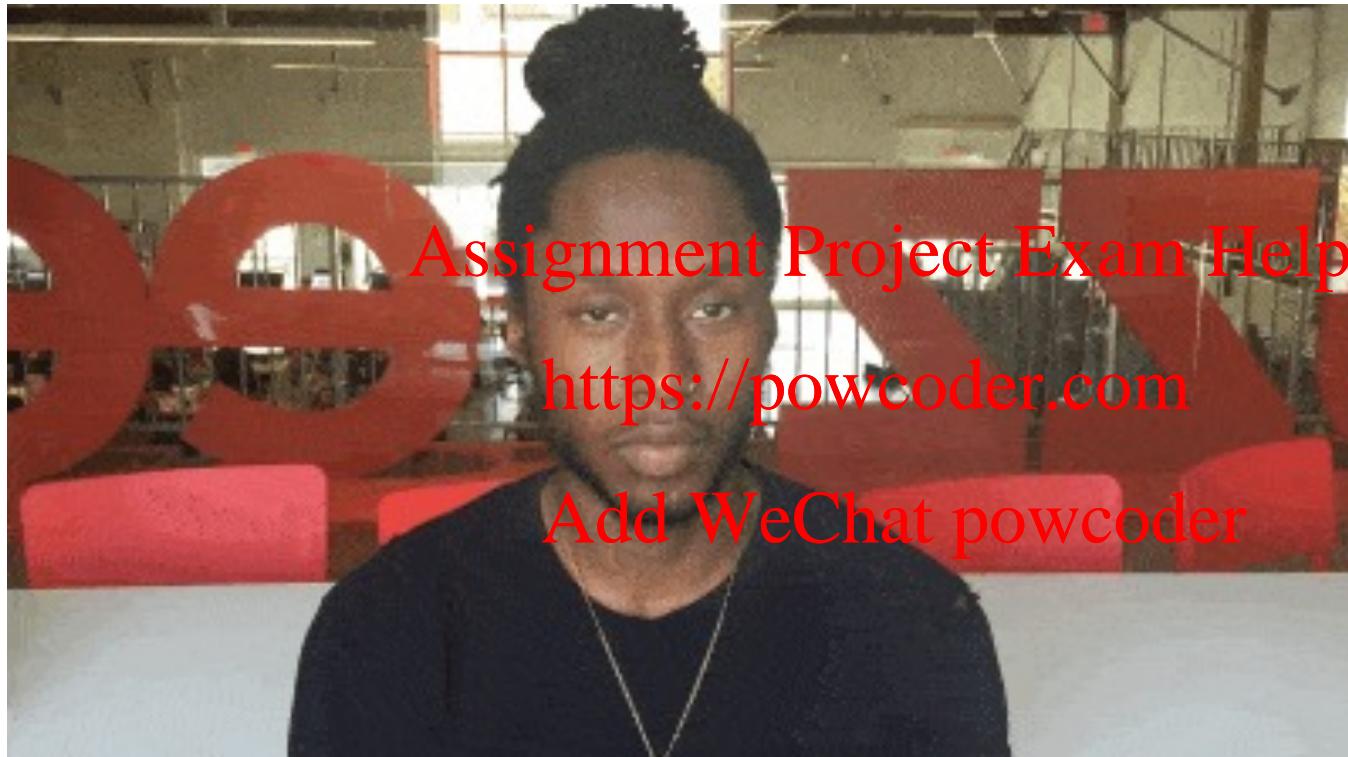


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Speech Perception



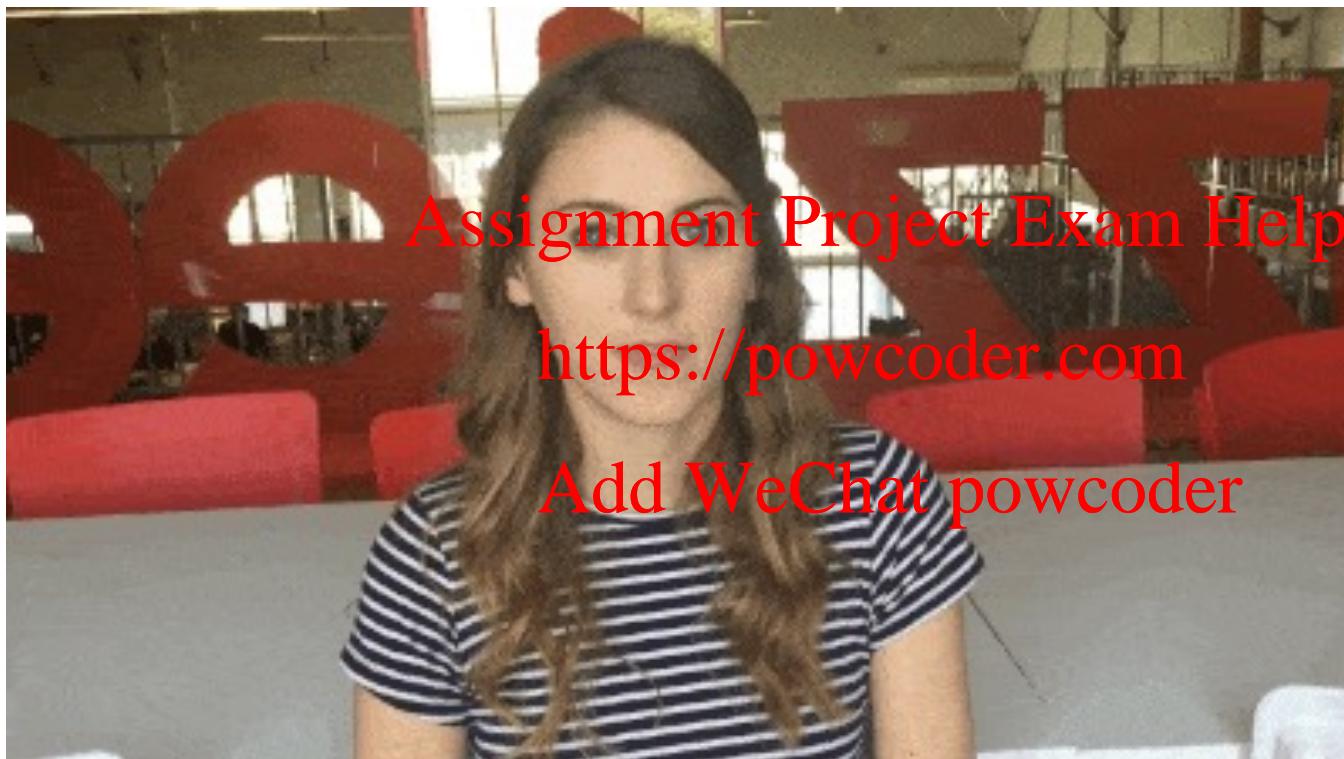
I'd love you
I love you
Olive juice ✓
I have two

Speech Perception



Bucket
Podcast
Modest ✓
Bodies

Speech Perception



Fight you
Factual
Value
Vacuum ✓

Speech Perception: Audiovisual Integration



McGurk Effect (McGurk & McDonald, 1976)

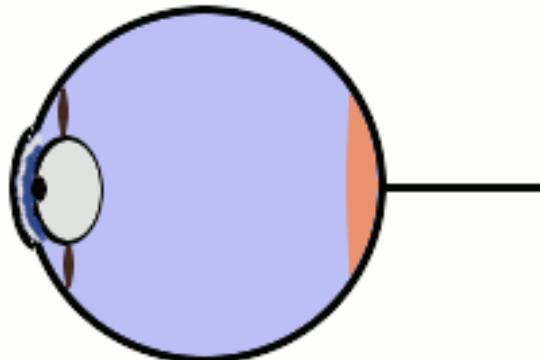
Perception of Time

Unlike spatial processing, hearing outperforms vision in temporal processing.

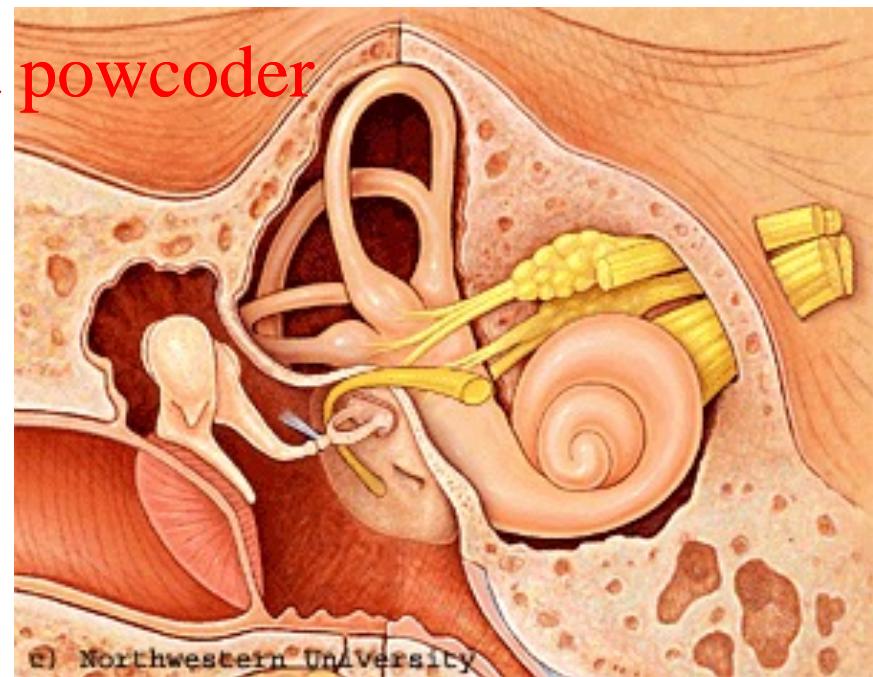
An auditory stimulus takes only 8–10 ms to reach the brain,
but a visual stimulus takes 20-40 ms.

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How The Eye Processes Light



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Perception of Time: Hearing Dominates Vision

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You are about to be FLASHED with black DISKS
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How many colors did you see?
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Vision and Hearing

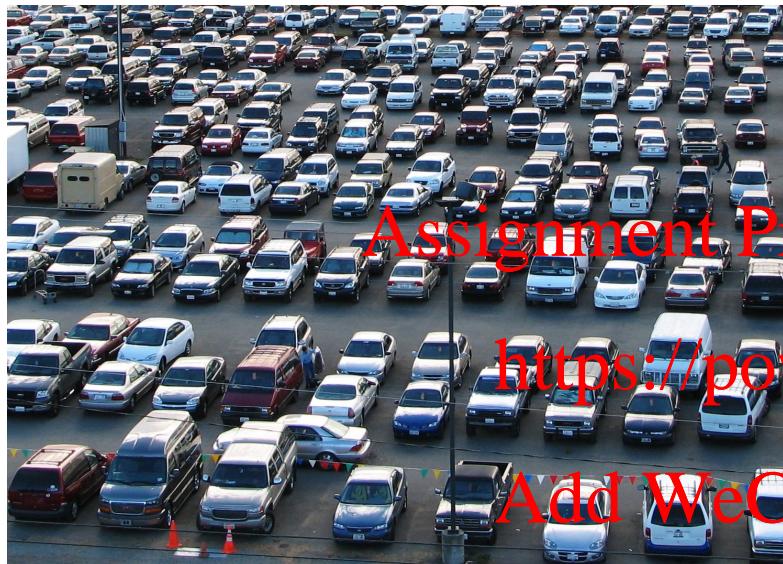
Why do we need redundant information from vision and hearing?

- Sound and visual images we encounter in daily life may not be ideal.

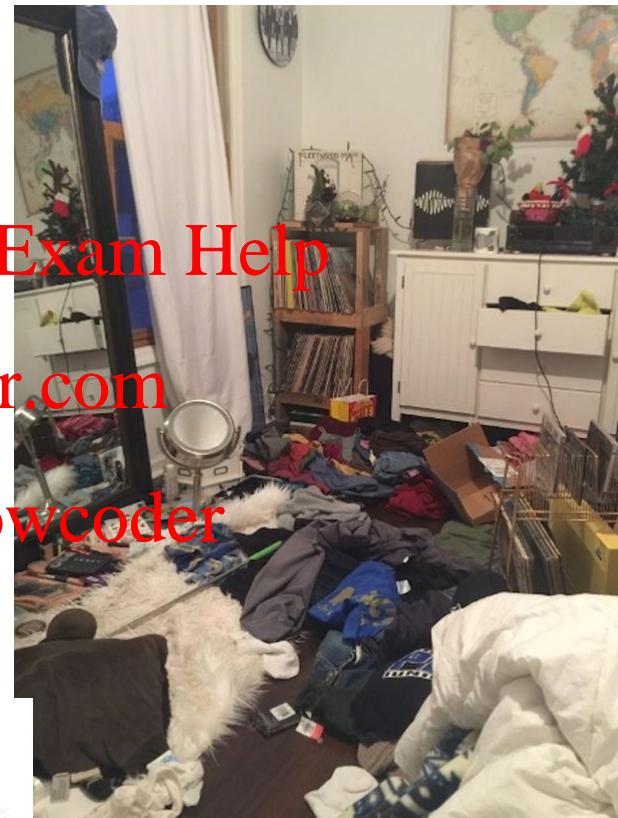
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Vision and Hearing

Vision is “noisy”.



Vision is “gone”.



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Both vision and hearing are noisy.



Vision and Hearing

Why do we need redundant information from vision and hearing?

- Sound and visual images we encounter in daily life may not be ideal.
- Vision and/or hearing may be impaired.

Outline

Interactions between Vision and Hearing

- *Think about how our senses work independently/interactively in our daily life.*

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An Introduction to Dual Sensory Loss

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- *Dual Sensory Loss > Vision Loss + Hearing Loss*

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Rehabilitation for Dual Sensory Loss

Vision Loss

Consequences of an eye disease or disorder on a measure of visual function such as acuity, contrast sensitivity or visual field.

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Causes of vision impairment:

- Macular degeneration
- Glaucoma
- Cataract
- Diabetic retinopathy
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Hearing Loss

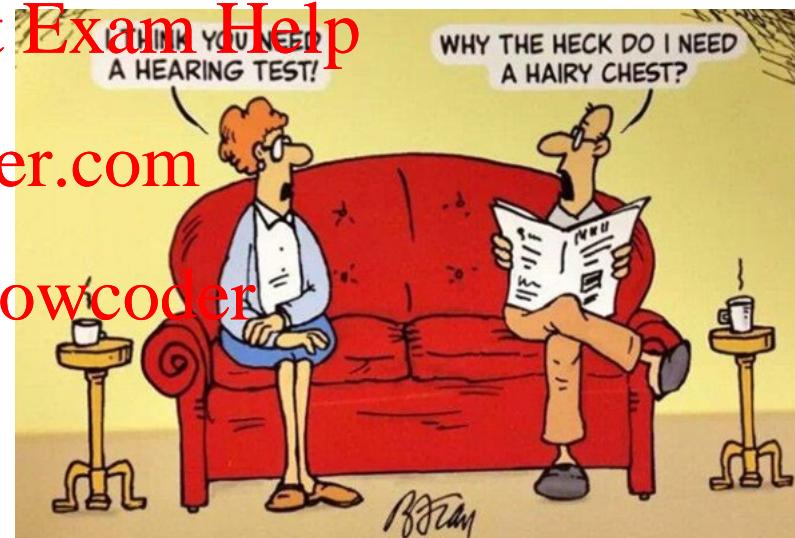
Complete or partial loss of the ability to hear from one or both ears.

Causes of hearing impairment:

- Ageing
- Noise
- Medication
- Trauma
- Ear infection
- ...

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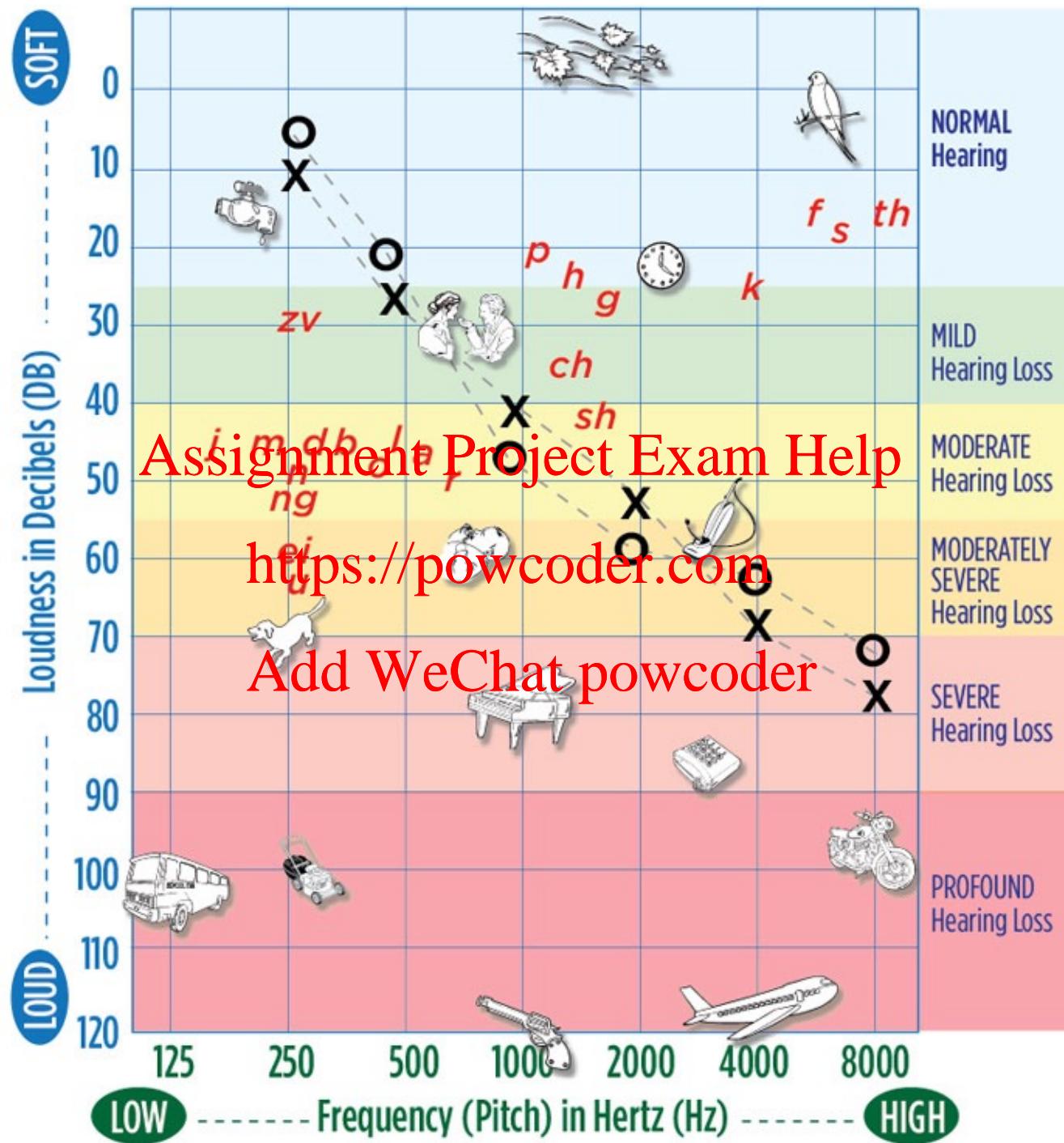
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Hearing

Complex
both ears

Criteria



or
r.

Dual Sensory Loss – Prevalence

Dual Sensory Loss concerns a large population.

Worldwide there are 0.2% population with severe Dual Sensory Loss (deafblind), and 2% with its mild form (*World Federation for the deafblind, 2018*).

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When we hear the term Deafblind, we often imagine a person who is unable to hear or see anything; however, this is typically not the case.

Dual Sensory Loss – Prevalence

The prevalence of Dual Sensory Loss increase with age.

Age-related DSL contributes to approximately 80% of the total DSL case.

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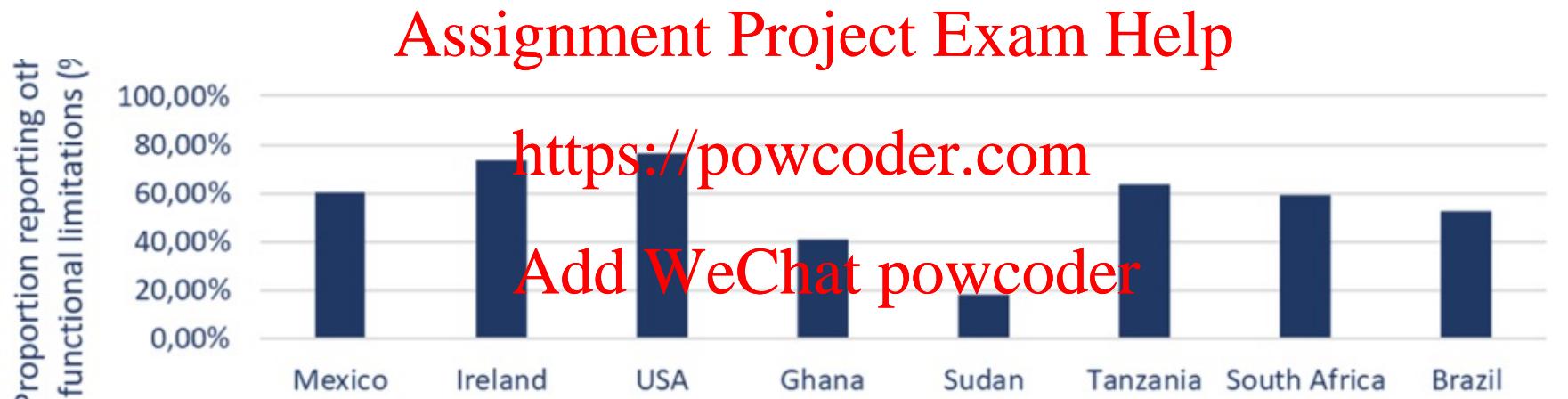
Table1. Characteristics among Individuals 45 Years of Age and Older in the US.

Age Range (yrs)	Vision Impairment Alone (%)	Hearing Impairment Alone (%)	Dual Sensory Impairment (%)
45-64	2.21 (2.20-2.23)	2.82 (2.80-2.84)	0.70 (0.69-0.71)
65-79	3.06 (3.03-3.09)	8.95 (8.90-9.00)	1.83 (1.81-1.86)
80+	5.67 (5.60-5.74)	20.59 (20.48-20.71)	7.62 (7.54-7.70)

Adapted from Fuller et al., 2018

Dual Sensory Loss > Vision Loss + Hearing Loss

1. Persons with Dual Sensory Loss often have additional disabilities.



(*World Federation for the deafblind, 2018*)

Dual Sensory Loss > Vision Loss + Hearing Loss

2. Persons with Dual Sensory Loss may experience poorer levels of health and barriers to accessing health services.

Common challenges to accessing both general health and rehabilitation services :

- a lack of accommodations in health facilities, particularly in terms of accessible information and alternative forms of communication;
- costs of accessing care, as insurance often does not always cover all expenses;
- concentration of services in cities, with little available in rural areas;
- a lack of knowledge of and training on Dual Sensory Loss among health professionals

(World Federation for the deafblind, 2018)

Dual Sensory Loss > Vision Loss + Hearing Loss



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Vision and Hearing
Loss Simulator

Dual Sensory Loss > Vision Loss + Hearing Loss



“Blindness separates people from things;
deafness separates people from people.”

— **Helen Keller**

3. People with Dual Sensory Loss show increased functional, social and psychological difficulties.

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- Developmental issues such as behavior disorders.
- Reduced activities
- More likely to show depression symptoms.

Brennan et al. (2005), Brennan et al. (2006), Dargent-Molina et al. (1996), Grue et al. (2009), Reuben et al. (1999), World Federation for the deafblind, (2018)

Dual Sensory Loss > Vision Loss + Hearing Loss

Sensory Loss and Cognitive Decline

- Two theories underlying the association between sensory loss and dementia
 - Cascade theory
 - Common cause theory
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4. Dual Sensory Loss increases the risk for cognitive decline than single sensory loss
- *Social engagement as a mediating factor:* Dual Sensory Loss was not associated with a greater cognitive decline among socially engaged individuals, while it was associated among socially disengaged individuals (Yamada et al., 2016).

Outline

Interactions between Vision and Hearing

- *Think about how our senses work independently/interactively in our daily life.*

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An Introduction to Dual Sensory Loss

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- *Dual Sensory Loss > Vision Loss + Hearing Loss*

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Rehabilitation for Dual Sensory Loss

- *Dual Sensory Loss > Vision Loss + Hearing Loss*
- *What can we do to make a difference?*

Rehabilitation for Dual Sensory Loss

The special rehabilitation needs by people with Dual Sensory Loss have received very little attention.

- Assistive devices for visually impaired persons usually assume good hearing and vice versa (Wittich et al., 2016; St-Amour et al., 2018). <https://powcoder.com>
- Dual Sensory Loss related topics were mostly absent in occupational therapy curriculum (Wittich et al., 2017).

Question: Can you think of an assistive device that is not “friendly” to persons with Dual Sensory Loss?

Access to Information

Hearing Compensation



Audio books

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Seeing AI

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OrCam

Access to Information

Vision compensation



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HELLO



GOODBYE



PLEASE



THANK YOU



YES



NO

Orientation & Mobility Training



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**Orientation & Mobility
Training**

**A story about getting a new
guide dog.**

Orientation & Mobility Training

Two arguments about blindfold training



Blindfold Training?

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“... they are still trying to rely only on their vision to navigate, and are not paying attention to their other senses that may enhance their mobility. In these cases, I suggest a student wear a blindfold when training to use a white cane.”
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someone who has low vision and who meets the legal criteria for blindness may not need or want to be blindfolded or employ the methods of blindness during the rehabilitative process or in daily life unless they are unequivocally more efficient and comfortable methods. “

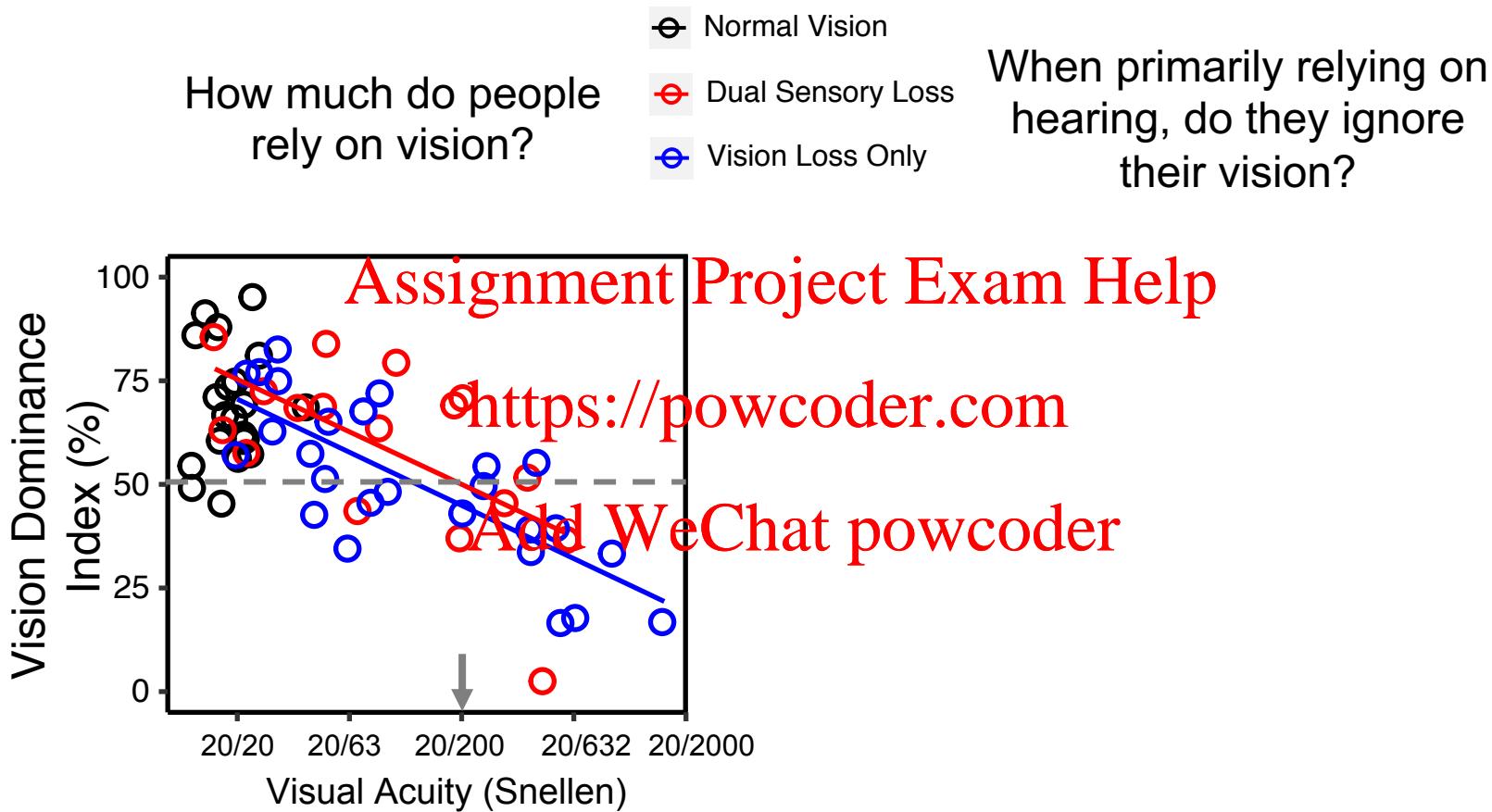
Orientation & Mobility Training

Spatial Localization Survey [35 real-life scenarios].

Examples:

- You are walking along a city sidewalk. A police vehicle is approaching with a siren sound and flashing lights. You need to determine which direction the police car is coming from.
- You are sitting with two friends at a table in a busy restaurant. Your friends are in a discussion and are talking back and forth. You want to keep track of who is talking.
- You are waiting for elevators in a building. There are three running elevators that make a beeping sound when they open up. You need to determine which elevator has opened.

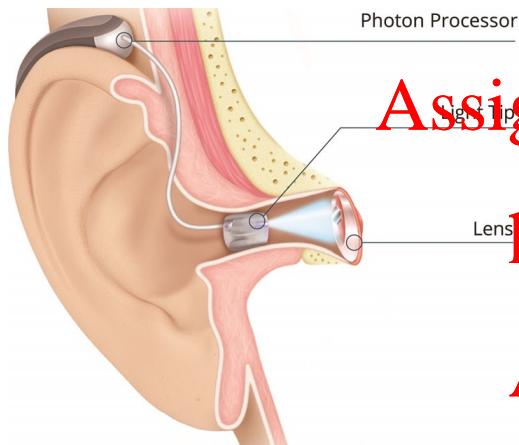
Orientation & Mobility Training



Hearing Aids

Hearing Aids

There are 30 million of people with hearing loss in the US. Only 1/5 use hearing aids.



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- Directionality of sound
- Accessibility of user interface
- Frequent updating
- Lack of knowledge of vision loss by Audiologists

Rehabilitation for Dual Sensory Loss

There is a need for an integrated vision and hearing rehabilitation approach that incorporate both vision and hearing impairment in the **assessment** and **intervention**, and **outcome evaluation** for patients.

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Take Home Message

Vision and hearing have many shared functions. They compensate each other in people with single sensory impairment.

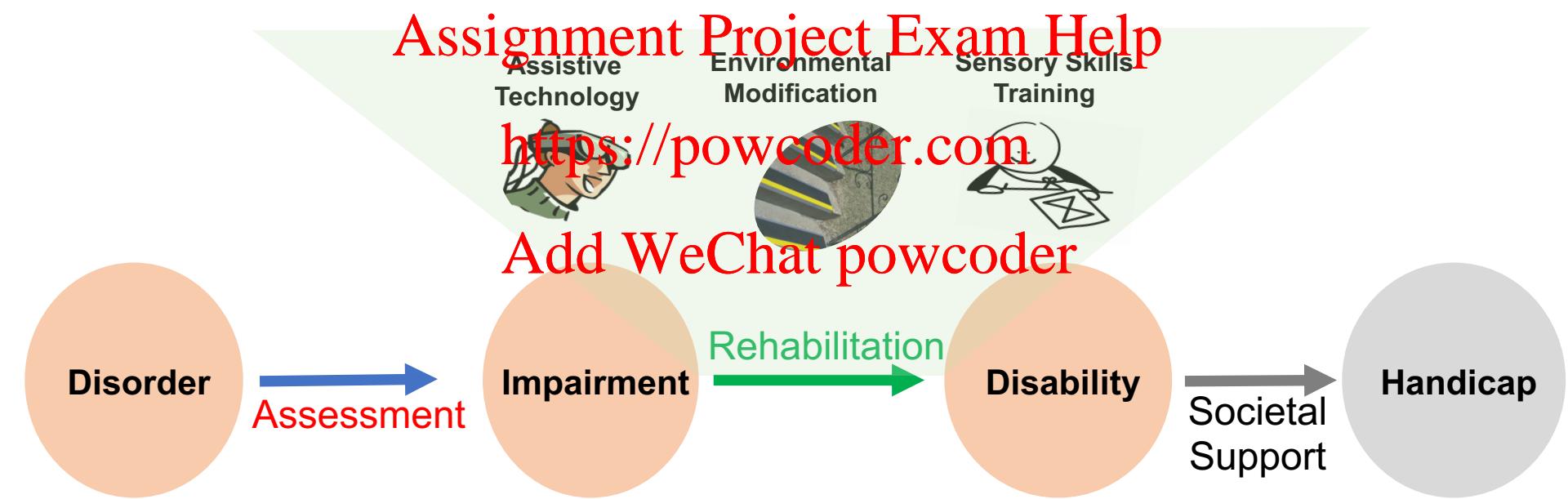
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Dual Sensory Loss concerns a large population with heterogeneous nature of diagnoses, severity, and onset.

Despite the efforts Add WeChat [powcoder](https://powcoder.com) to the rehabilitation for vision or hearing loss individually, the special needs of people with Dual Sensory Loss have received very little attention.

Take Home Message

Dual Sensory Loss needs more rehabilitation and research efforts.



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Thank you!
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