



SOAR (Supporting Outcomes through Assessment & Resources) Application for Auditory Skill and Language Development



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Introduction

The 2007 Joint Committee on Infant Hearing (JCIH) statement on early intervention recommends: "Monitor the developmental progress of all infants identified through universal newborn hearing screening (UNHS) on a consistent schedule, every 6 months through 36 months and annually thereafter, to ensure that children are making appropriate progress" (Muse et al., 2013). To attain this goal for all children, tools need to be placed into the hands of family members and other accessible professionals who can help monitor the child's hearing progress.

One of these tools is the LittIEARS Auditory Questionnaire, which evaluates auditory skill development for children up to 2 years of age with normal hearing and for the first 2 years following being fit with appropriate hearing technology for those with hearing loss (Coninx et al., 2009; MED-EL, 2022; Tsiakpini et al., 2004). This provides an excellent overview of what skills need attention, but it falls short of its goal if it does not lead to appropriate intervention.

The Supporting Outcomes through Access to Resources (SOAR) online curriculum has been developed to help bridge this gap by linking the results of the LittIEARS Questionnaire to auditory skill development resources. This website lays out auditory skills and ideas for development that families can utilize at home.

The objective of this project was to enhance accessibility to SOAR resources and streamline information dissemination, thereby facilitating parental support in fostering auditory skill development in young children.

Methods

In this study, we employed the MED-EL LittIEARS Auditory Questionnaire in combination with the Idaho State University - Helping Adults Talk to Children (HATCH) Lab resources to enhance the interpretation of audiological testing. The goal of improving parents' ability to access and understand these resources was achieved through a multifactorial approach:

1. Categorize the 35 auditory skills based on the 4 stages of auditory development: **detection, discrimination, identification, and comprehension**. Erber's Auditory Hierarchy (Erber, 1982) was utilized to define milestones and the structure for our categorization.

1. Develop a document to assist in the understanding of auditory skill development and interpreting questionnaire results, with the goal of ensuring clarity for both parents and providers.

1. Organize the document to address the following:
 - a. Basic knowledge of what to expect when visiting the audiologist,
 - b. Understanding the foundations of the LittIEARS auditory questionnaire.
 - c. Interpretation of individual question results with interactive videos displaying audiological skill development.

Results

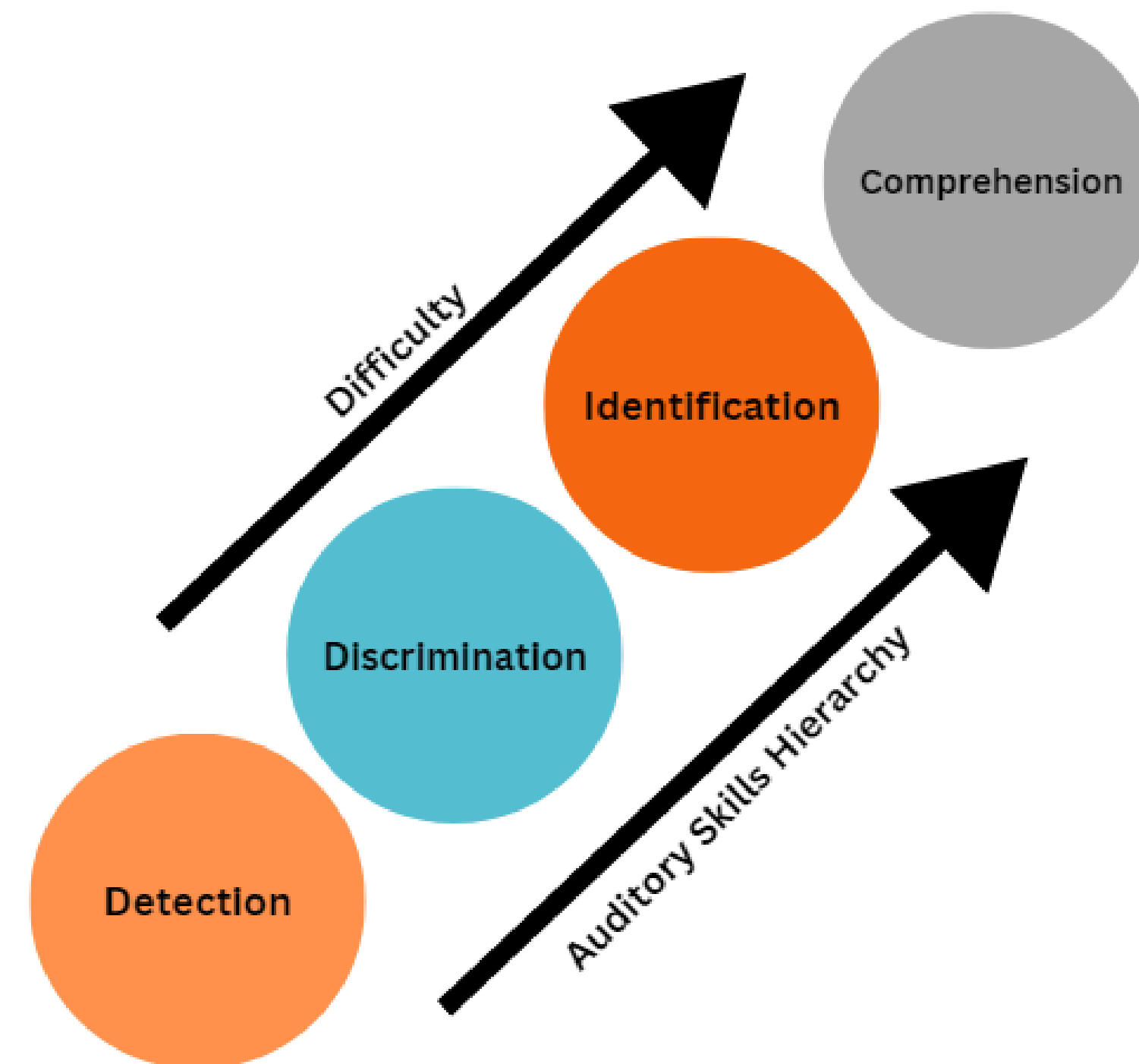


Figure 1. Erber's Listening Hierarchy was used to organize the MED-EL LittIEARS Questionnaire into smaller components.

Detection	Discrimination	Identification	Comprehension
2. Does your child listen to somebody speaking?	20. Does your child know family members' names?	1. Does your child reSpond to a familiar voice?	8. Does your child stop crying when you speak to them without them seeing you?
3. When someone is speaking, does your child turn their head towards the speaker?	26. does your child produce the right sound of a toy?	12. Does your child react to their name?	9. Does your child respond with alarm when hearing an angry voice?
4. Is your child interested in toys producing sounds or music?	27. Does your child know that certain sounds go with certain animals?	17. Does your child know that a certain sound is related to a certain object or event?	10. Does your child "recognize" acoustic rituals?
5. Does your child look for a speaker they cannot see?	29. Does your child correctly repeat a sequence of short and long syllables you have said?	21. Does your child imitate certain sounds when asked?	14. When your child is sad or moody, can they be calmed down or influenced by music?
6. Does your child listen when the radio/CD/tape player is turned on?	30. Does your child select the right object from a number of objects when asked?	25. Does your child imitate sounds or words you say?	18. Does your child appropriately respond to short and simple remarks?

Figure 2. Questions from MED-EL's LittIEARS Questionnaire were individually analyzed and broken up into the Listening Hierarchy categories. Five example questions from each category are shown.

Discussion

We know that unclear or overwhelming information can be a barrier to parents engaging in early intervention (Harrison et al., 2016). The SOAR tool can be improved by simplifying the results and relating them back to the 4 basic stages of auditory development: detection, discrimination, identification, and comprehension. The product of this project is a collection of auditory skills resources developed to improve the accessibility and intelligibility of the LittIEARS questionnaire. This resource provides tools for parents to monitor and facilitate the development of crucial early auditory skills. In the future we hope to share these resources with parents and caregivers to receive feedback on how this tool can be improved to further meet their needs. Future studies should also analyze patterns between the different questions and overall trends within and between the four Listening Hierarchy categories to better understand how this organization can be used in understanding auditory skill development.

Conclusion

This project was novel in the organization of the 35 LittIEARS questions into Erber's Hierarchy of Auditory Skill Development. We believe that with a stronger understanding of auditory skill development in children, caregivers will access intervention earlier and at higher rates.

Key References

Coninx, F. et al., (2009). Validation of the LittIEARS auditory questionnaire in children with normal hearing. *International Journal of Pediatric Otorhinolaryngology*, 73, 1761-1768. doi: 10.1016/j.ijporl.2009.09.036
Erber, N. P. (1982). *Auditory training*. Washington, DC: AG Bell Association for the Deaf.
Harrison, M. et al., (2016). Factors affecting early services for children who are hard of hearing. *Language, Speech, and Hearing Services in Schools*, 47, 16-30. doi: 10.1044/2015_LSHSS-14-0078
MED-EL. (2022). LittIEARS® Auditory questionnaire for assessment of Babies & Toddlers - MED-EL professionals blog. MED. <https://blog.medel.pro/rehabilitation/littleears-auditory-questionnaire-for-assessment-of-babies-toddlers/>
Muse, C. et al., (2013). Supplement to the JCIH 2007 position statement: Principles and guidelines for early intervention after confirmation that a child is deaf or hard of hearing. *American Academy of Pediatrics*, 131(4), 1324-1351. doi: 10.1542/peds.2013-0008
Tsiakpini L. et al., (2004). LittIEARS Auditory Questionnaire. Innsbruck, Austria: MED-EL

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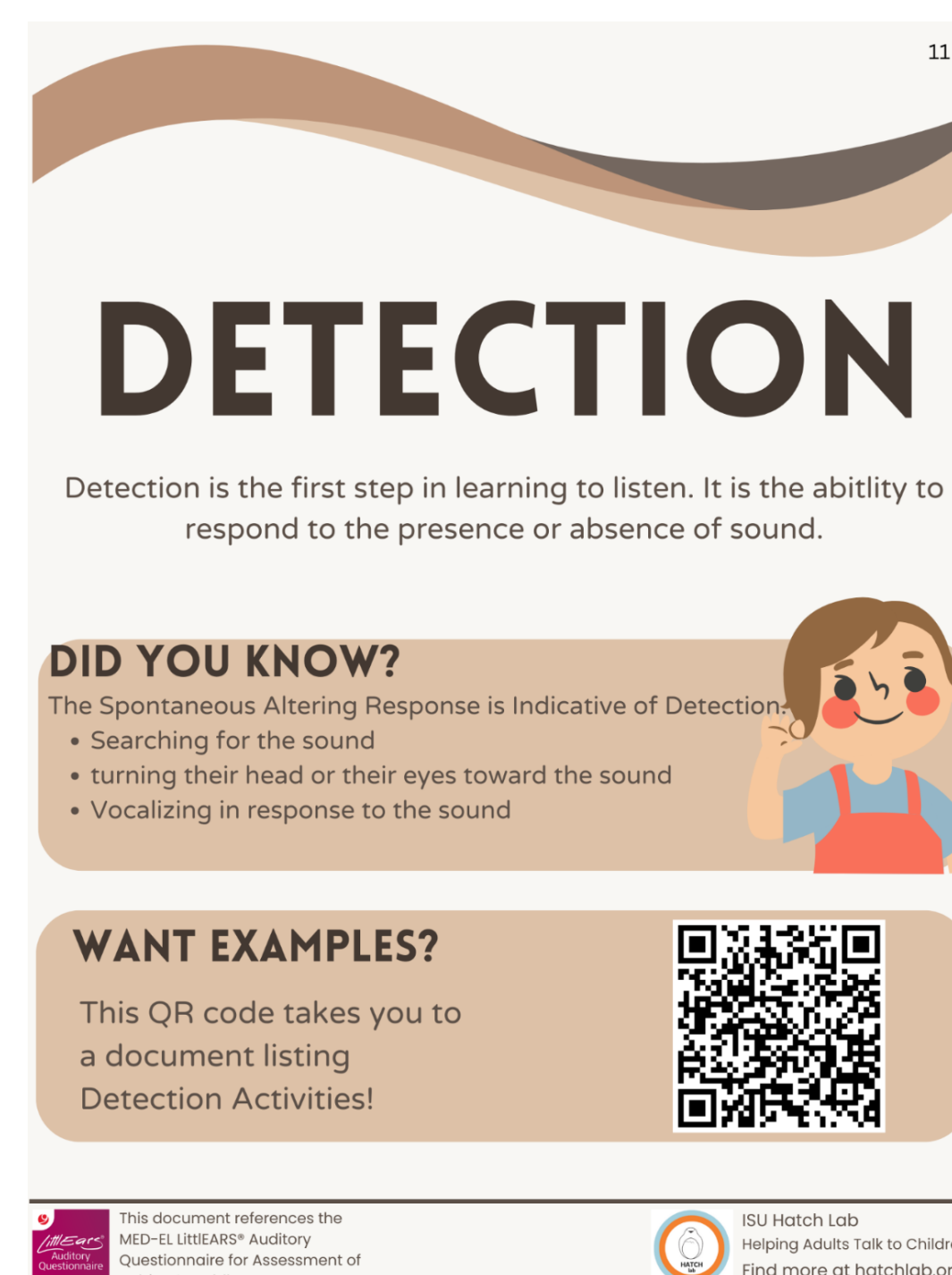


Figure 3 & 4. Sample pages from the 53 page book created which expounds on each Listening Hierarchy category and the questions from LittIEARS Questionnaire that correspond to each category. The book also contains resources for parents on how to find a pediatric audiologist, what to expect during an appointment, and tips for assisting in auditory skill development such as games and video examples.



Figure 5. QR Code to access the Applications for Auditory Skill and Language Development book