

# Visual Reinforcement Audiometry as a Method for Setting Functional Children Hearing Rehabilitation in Early Care



Martina Péčová, Iva Jungwirthová, Alžběta Osmančíková, Anna Kučerová

Center for Children's Hearing Tamtam

## What Is VRA and Why Do We Need It?

Visual reinforcement audiometry (VRA) is a test that allows an audiologist to assess hearing in infants and toddlers too young for standard behavioral tests. VRA relies on behavioral conditioning to train very young kids to respond to sounds.

According to the American Speech–Language–Hearing Association behavioral assessment VRA is the behavioral test of choice to assess hearing in infants who are chronologically/developmentally 5 through 24 months of age.

Objective hearing tests (i.e. ABR, SSEP) sometimes do not correspond with the child's functional reactions to sound stimuli. This is especially true in extremely premature babies or children with atypical EEG.

The parents are then in a very difficult situation. The recommended hearing compensation is set up according to the results of objective hearing tests, though the observation of child's reactions may differ.

The potential detrimental effects of this include: low motivation for using the technology, concern about damage of residual hearing of the child, disagreement with professional assessment, declining self-confidence in the parents, or mistrust of audiological tests in general.

Therefore, there exists a need for a systematic, quantitative observation of the child's reactions to specifically defined sound stimuli – VRA.



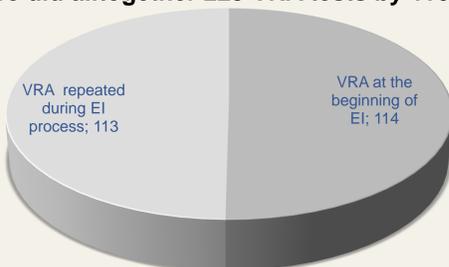
## A Bit of History

15 years ago we started systematically monitoring children's reactions to sound toys by which we knew their sound intensity and basic frequency.

In 2010, we started to use a Visual Supported Audiometry system from the Academy of Music in Prague. With that, we tested **hundreds of children**.

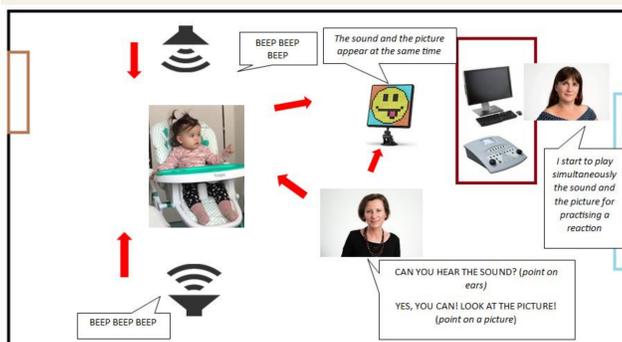
Since September 2021, we have been using a fully professional audiometric system, Inventis Maestro. This device enables to also measure Subjective Tone Audiometry as well as the Speech Discrimination Test, which we use with older children.

**From then we did altogether 229 VRA tests by 116 children.**

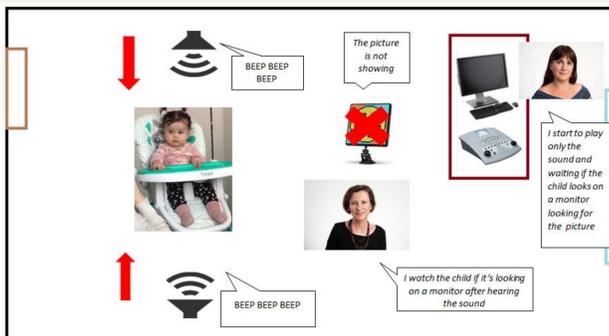


## How Does VRA Work?

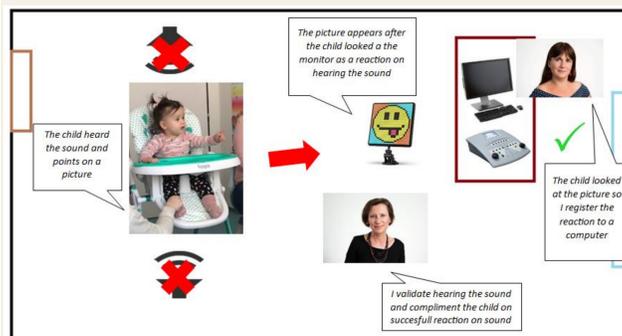
While the child sits in a baby chair or in a parent's lap, the audiologist plays a tone from the loudspeakers. At the same time, the audiologist presents in conjunction with the sound a picture on a monitor. This "trains" the child to respond by looking at the monitor.



Once the child understands what to do, the audiologist presents the tone without visual stimulus.



If the child looks at the monitor to see the picture, the audiologist can "reward" the child by briefly delaying the visual stimuli.



**The aim of the test is to obtain threshold hearing levels at frequencies which are of most importance for spoken language understanding.**

- Usually we measure 4 basic frequencies - 500 Hz, 1, 2 and 4 kHz.
- We use a discontinuous warble tone, which is often the most interesting for small children acoustically.
- We adjust the volume in 5 dB steps.

## The Use of VRA in Early Intervention

Together with the parents and other members of the Early Intervention Team, we can observe and describe the child's specific reaction to sound stimuli.

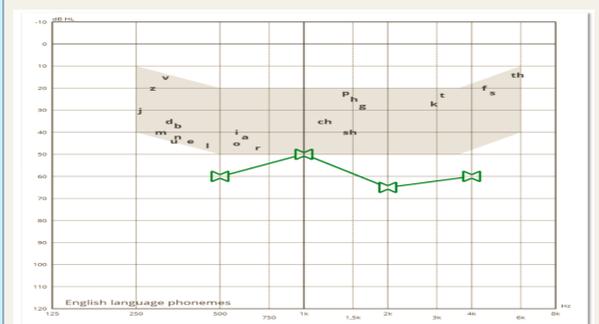
We can then graph the results to „speech banana“, which helps the parents understand their child's hearing capabilities and/or limitations.

We can discuss the VRA the VRA results with other professionals – phoniatrists and speech therapists.

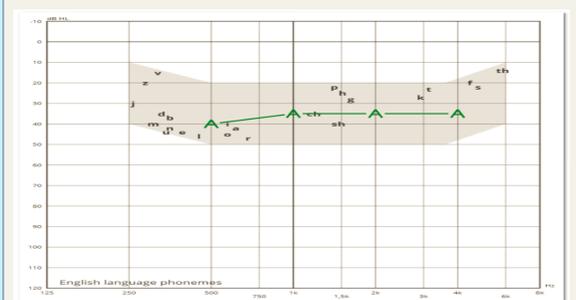
The VRA results can motivate parents who have doubts about the cochlear implantation process, for example if they see that even with hearing aids their child cannot access spoken language.

They can also encourage the parents to use hearing aids if they see that the child is underperforming in the VRA test without hearing aids, and that the child's reactions are improving by using them.

VRA of a child with medium hearing loss without hearing aids



VRA of the same child with hearing aids



## What Is Necessary

- The child has to be interested (and able to see) the visual reinforcement stimulus.
- We need a certain amount of concentration and attention of the child.
- The child has to sit in a baby chair or in their parent's lap during the test.

## Conclusion

The VRA test has become an integral part of our work. It helps us, the parents and other professionals to better understand the child's listening skills and to assess the benefit of the child's up-to-date compensation. This is necessary for setting the optimal rehabilitation process and thus for enabling the child's best possible developmental trajectory.

## Contact Information

[pecova@tamtam.cz](mailto:pecova@tamtam.cz)  
[jungwirthova@tamtam.cz](mailto:jungwirthova@tamtam.cz)  
[osmancikova@tamtam.cz](mailto:osmancikova@tamtam.cz)  
[kucerova@tamtam.cz](mailto:kucerova@tamtam.cz)  
[www.tamtam.cz](http://www.tamtam.cz)