

Auditory Processing and ASD

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Processing!

Our central nervous system (CNS) is pre-tuned to accept and interpret speech that it receives at the rhythms (prosody) and rates (speed) that it can process with greatest ease.

Continuum of development

- Birth to age 16 maturing auditory system
- Age 16 to 35 optimal auditory performance
- Age 36 decline in auditory system begins

Age 3-5

A typical child's central auditory system can process the phonemic/linguistic codes of spoken speech at a rate of approximately 120 -124 WPM*.

*When all else in the listening environment is nearly optimal...little to no background noise, visual distractions, etc.

Age 6-8

A typical child's central auditory system can process the phonemic/linguistic codes of spoken speech at a rate of approximately 128-130 WPM.*

*When all else in the listening environment is nearly optimal...little to no background noise, visual distractions, etc.

Older students

- Upper elementary 4th-5th 135 WPM*
- Middle school and high school 135-140 WPM*

*When all else in the listening environment is nearly optimal...little to no background noise, visual distractions, etc.

What about adults WPM?

Research has indicated the average WPM of most American adults, including elementary education and special education teachers, is approximately 160-180 WPM, and many reach 190-200 WPM !!

Examples

- 124-125 WPM
- Mr. Rogers
 - Dora the Explorer
 - Mr. Greenjeans
 - Captain Kangaroo

What about Sponge Bob, Cartoon Network & fast talking adults (educators)?
160-200 WPM

What does 160-200 WPM mean for all students?

- This speed is detrimental to a child's ability to attend to spoken language at home and in the classroom.
- Children don't actually "listen" when they listen at this speed. Rather, they use their eyes to follow the story, not their auditory system. (This is ok for cartoons not for the classroom)
- This could be one reason why we have more students who need visual supports in the classroom.

Why Don't They Listen!

I think they have a processing delay.

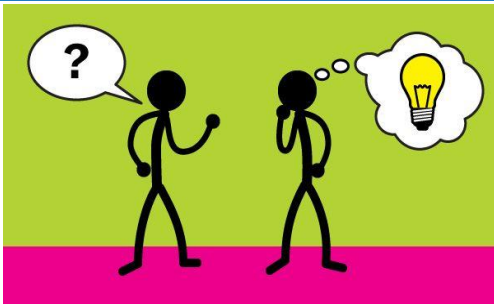
Teachers and parents wonder why children do not seem to understand what they are saying, are not attentive, or "My children just aren't good listeners! How many times do I have to say it before they understand! They just don't seem to listen! I gave the assignment to the children three times, and they still acted like they didn't understand! Why don't they listen!".

How do we react when children aren't "listening? Processing?"

- Maintain eye contact or face to face communication
- Slow our rate
- Raise our voice
- Over enunciate

Then we think they finally are "listening" when in fact we have simply matched their CNS auditory processing developmental level.

Before we move on.....



Language processing in ASD

What do we know?

- Neuroimaging studies indicate that individuals with ASD use the same basic language processing areas as control participants.
- Neuro-functional differences suggest that these areas function somewhat differently in individuals with ASD.
- Depending on the demands the ASD group may have more or less activation in the language areas.

What do we know continued?

- The language network of individuals with ASD is not as well synchronized as that of controls.
- When individuals with ASD successfully process language, they may be using the upper limits of their linguistic processing resources, therefore when demand increases there may not be additional processing resources to draw upon due to "biological constraint"

What do we know continued?

- During learning and use of language individuals with ASD must use more explicit or controlled processing strategies, which are more costly with respect to the use of processing resources.
- The ultimate result of these neuro-functional differences is that individuals with ASD must work harder than typically developing controls for the same behavioral result.

Implications for individuals with ASD

- When the processing demands of the task increase even a small amount, the individual with ASD may not have additional processing resources to draw upon. This can lead to emotional “melt-downs” or other feelings of being overwhelmed.
- Rapid speech rate places increased demands on the language processing centers of all listeners.

Implications for individuals with ASD

- Learning can be improved in ASD by reducing the information processing demands of the task, thereby freeing up processing resources.
- Reducing language rate will free up processing resources.
- Visuals, Visuals, Visuals!

What Can We Do!

(Enhance speech and listening environment)

- Talk to children at a rate that a child’s CNS auditory system can be expected to process efficiently.
- Use simpler vocabulary or single step directions.
- Ask simple and clarification questions.
- Use visuals targeted at key points.
- Reduce background noise whenever possible.
- Reduce use of “distracting” visuals.

What Can We Do!

(Enhance speech and listening environment)

- A break between tasks will assist with the ability to “switch” resources.
- Provide organizational structure so that processing resources are not used to self-talk organization.
- Provide additional concrete examples.
- Use exaggerated articulation or prosody to clearly define the end of one word and beginning of the next.

References

Hull, Ray PhD; Mini seminar: Inadvertent Impairments in Children or, Why Children are Sometimes Misdiagnosed as CAP Disordered, or Developmentally Delayed. ASHA 2013.

Williams, Diane L; Processing in Autism Spectrum Disorders: Insights from Neuroscience, *Perspectives on Language Learning and Education* 98-107

Thank You!

