Lucker's System Integrative Approach and Treatment of APD

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Overview

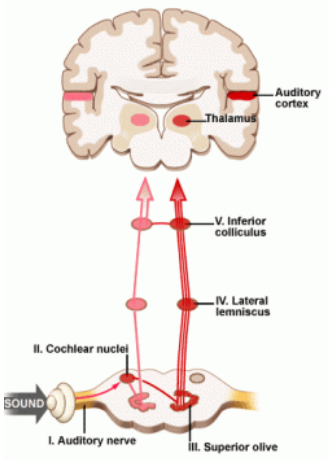
- Comparing Lucker's Model – updating the Buffalo Model
- The various systems involved in Lucker's Model
- Categories of APD based on Lucker's Model
- Treatment strategies in each category of APD

Underlying Principles in Early Models/Approaches to APD

- When the original models (including the Buffalo Model) or approaches to APD were developed, we had limited knowledge regarding how people perceive and "process" what they hear
- The main focus was (and still is) on the auditory system as the SOLE system involved in auditory processing
- The focus was to look for disorders of the auditory system and describe how they affected people's processing abilities

Underlying Principles in Early Models/Approaches to APD

- The usual approach, and one underlying Katz's original approach to APD evaluation, was to look at adults (and a few children) with focal lesions
- If a person with a brainstem lesion could not deal successfully with speech understanding in noise, we concluded that people who have problems with SIN have deficits in their brainstem auditory pathways
- If a person has a left hemisphere lesion…..etc.



Katz's Change and the Development of the Buffalo Model

- In maybe the early 1980s, Dr. Katz decided to take a different approach
- He looked at children he and the audiologists at SUNY@Buffalo had identified with APD problems and categorized their different problems such as
  - Problems with phonemic awareness
  - Problems with integration
  - Problems with distractibility and memory
  - Organization/Sequencing
- They then developed what has become the Buffalo Model

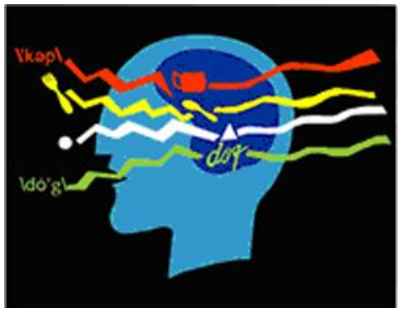
"Times Have Cha-anged"

- Over time, we learned more and more about the brain and about how people process information in general
- Example: distractibility could be due to external factors or internal regulation problems related to what we call "executive functioning"
- Also, some people, such as myself, took very different approaches
- One of the main changes was taken by SLPs

Auditory Processing and Language Processing: Same or Different?

- Many professionals do not differentiate between ***auditory processing*** and ***receptive language***
- They say that the **child has an APD** because he/she **failed language tests**
- They say that the child cannot have APD because he/she passed language tests
- They state that APD and language disorders are the same
- Are they?

APD vs. Language Processing



- Lucker's research
- N = 90
- Age range 5 to 17 years old
- All seen for both auditory processing and language processing evaluations
- All found to have normal cognitive abilities (lowest IQ scores = 90 or better; subtests 8 or better (both are the 25th percentile)
- For pass/fail criterion for language and APD tests, used that same 90 or better (pass)/80 or lower fail
- For APD tests, used differing results since some use standard scores most use criterion referencing

APD vs. Language Processing

- Findings:
- N = 90
- 2% (2 children) failed only language tests
- 59% failed both auditory processing and language tests
- 39% failed only auditory processing tests
- Can these 39% get services in schools?

Lucker's Definition: Auditory Information Processing

- Those things the entire central nervous system does when it receives information through the auditory system and gets it to the brain where it eventually will form meaningful concepts

Lucker's Approach

- Instead of looking at people with focal lesions or any disorders of the central nervous system……
- I looked at children with normal development and how they deal successfully with auditory information and contrasted them with…..
- Children who had hear loss and learning/listening problems
- Thus, I looked at the normal development of auditory skills in all children and

The *Six* Primary Systems Involved in Processing Auditory Information

- Obviously, we need to take in the signal through the ***auditory system***
- We need to form the concepts and remember things and make decisions using our **cognitive systems**
- We use our knowledge of language and linguistic rules to help in processing auditory information = **language system**

The Fourth & Fifth Systems

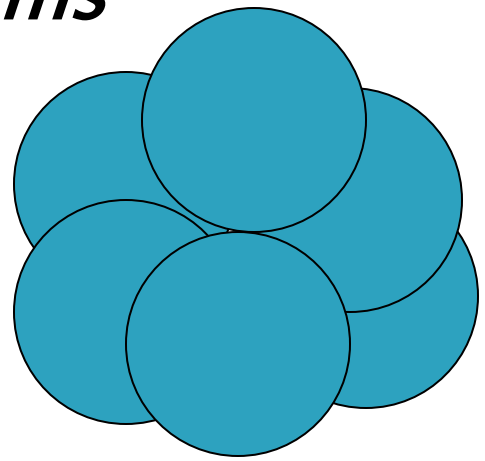
- A large part about how we process relates to how we ***attend to*** what we hear
- This involves concentration, **self-regulation**, focal attention, sustained attention = **executive functioning** control (behavior)
- Also, our **emotional state** of being affects how we "listen"
- Problems in the **Behavioral and Emotional systems** can largely affect auditory processing (including problems with executive functioning and self-regulation)

The Sixth System

- There is a "system" in our brains that gates or monitors sensory input
  - Auditory information is sensory input
- Thus, we need to consider **processing by our "sensory regulator"**
- Children with sensory processing difficulties or sensory regulation problems ***MAY*** have auditory sensory processing disorders

Lucker's System Integrative Concept

- Auditory processing disorders come from ***one or more of six systems***
  - Auditory
  - Cognitive
  - Language
  - Behavioral/Executive
  - Emotional
  - Sensory



- In many cases, the problem is with the integration of these six systems

Lucker's Approach Built on the Buffalo Model

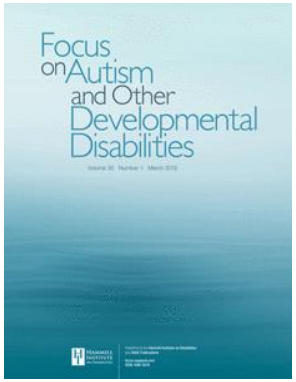
- Basic Buffalo Model has four categories and some sub-categories within each
- **Decoding**: for many years focused only on phonological processing or phonemic awareness
- **Tolerance-Fading Memory**: Is this really APD or self-regulation/attention and, thus, executive functioning problems?
- **Integration**: Integration of what: only the right and left hemispheres?
- **Organization & Sequencing:** Input or Output?

Lucker's Categories: Sensitivity

- ***Awareness, detection***, knowing that a sound exists (hearing loss vs. hyposensitivity)
  - **Teach children to be aware of sounds and detect what sound it might be**
- ***Hypersensitivity*** to loud sound

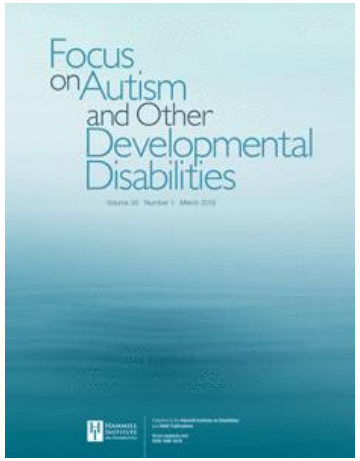
Lucker's Research on Loudness Tolerance: Auditory Hypersensitivity

- Published in the journal ***Focus on Autism & Other Dev. Disabilities – March 2013***
- 200 children: 150 with loudness tolerance problems not in the autistic spectrum and 50 children in the spectrum
  - Age range from around 3-½ to 17 years
- All presented with complaints of ***hypersensitivity*** to sounds
- All found to have normal hearing and able to take standard hearing tests with earphones



Lucker's Research on Loudness Tolerance: Auditory Hypersensitivity

- Evaluated tolerance for warbled tones and narrow band noises up to 110dBHL
  - Tested all frequencies from 250 – 8000 Hz
- Overall, 86% of the children COULD tolerate sounds above 110dBHL
  - 92% non-ASD
  - 68% ASD



Lucker's Research on Loudness Tolerance: Auditory Hypersensitivity

- Conclusion: ***Hypersensitivity is <u>not</u> an auditory system problem***
  - Hypersensitivity may be considered as Phonophobia (Fear of Sound)
- We need to **provide desensitization training**
- May also benefit from use of sound interventions
  - The Listening Program, Therapeutic Listening, Integrated Listening Systems, Samonas, others….

Lucker's Recent Research

- Dr. Lucker and a colleague (Dr. Vargas, OT) completed a META-ANALYSIS of published research on TLP
- Findings revealed those studies investigating auditory factors showed the **greatest EFFECT SIZE** (significance of magnitude of improvement) in AUDITORY factors after TLP training

Lucker's Categories: Extraction

- **Extraction =**
  - Extracting the "code" from the ongoing flow of auditory information
- We extract at three levels
  - First = temporal
  - Second = phonological
  - Third = linguisitic

Auditory Temporal Extraction

- Temporal Extraction (speed of processing)
  - Involves using the time differences between words to identify whether you hear one word or two words, one continuous sentence or two different sentences, etc.
  - We also are able to integrate the time or temporal factors and we can understand slow speech or rapid speech
    - It is our understanding of rapid speech that we use to assess temporal extraction

Auditory Phonological Extraction

- Phonological Extraction
  - Eventually leads to phonemic awareness
  - Involves discrimination
  - Strategy = feature detection
    - Stops vs. Continuants
    - Voiced vs. Voiceless
    - Noisy vs. Smooth sounds
  - Identify the feature differenc
  - Not just same-different

Auditory Lexical Extraction

- Lexical Extraction (linguistic level)
  - **Key words**
- Consider this sentence: “Mother went to the store to buy a loaf of bread.”
- What did you actually pull out of this sentence and place into memory?
- Did you pull out something like: “mother– store – bought – bread”

Lucker's Categories: Attention

- There are really different levels of attention:
- **Set to attend – Selective attention**
  - Not a problem with children with APD
- **Focusing and filtering** (relevancy)
  - Primary problem with APD due to poor filtering abilities so the background noises/sounds become an auditory distraction
- **Strategy**: *Improve focusing on the primary message*

Lucker's Categories: Attention

- **Maintaining attention**
  - Not a problem with children with APD so long as they understand the message
  - This is the way we formally assess and differentiate between APD and ADHD or other attention/executive functioning/self-regulation problems
  - **Dividing attention – Switching**
  - Can be a problem for children with APD due to multitasking
- Strategy: Focus work on self-regulation and attention = executive functioning

Lucker's Categories: Memory or Storage

- Primarily a cognitive process and not primarily an auditory process
- The auditory memory part of memory actually involves language
  - How we tag or label information when we place it in memory
  - How we categorize and associate that information
- *Strategy: teach relabeling, categorization, association, organization, mnemonics, etc.*
  - *Check out **auditory overloading**/emotional issues*

Lucker's Categories: Integration

- Putting it all together
- Task analysis
- Problem solving
- Cognitive strategies
- Executive control
- Also, multisensory integration
- *Strategy: teach **metacognitive, metalinguistic, metaauditory** skills*

Lucker's Categories: Organization and Sequencing

- We organize and sequence the events in messages
- We can have problems with certain tasks if we can't sequence/organize properly
- *Strategy: teach child use of Graphic Organizers and other external organization strategies*
  - Be sure these organizational strategies work for the child

Summary

- Thus, APD is not merely a disorder of the auditory system
- It involves multiple systems
- It also involves the integration of these systems working together
- You need to identify the specific system(s) that leads to the APD problems – not “one size fits all”

Evaluating Auditory Processing

Evaluating Auditory *Information* Processing

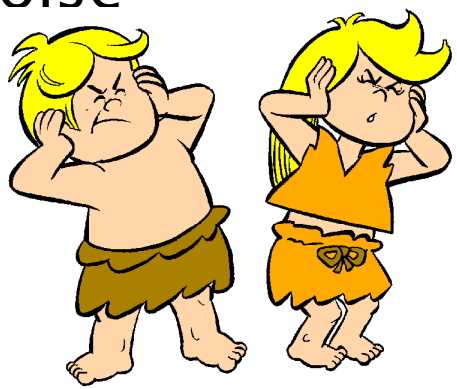
- We need a comprehensive assessment to look at all of the systems
  - Audiological tests (Aud)
  - Cognitive test results (Psych)
  - Language test results (SLP)
  - Emotional/behavioral test results (Psych)
  - Executive functioning results (Psych)
  - Sensory results (OT)

Accommodations

- Remember, accommodations **do not treat the disorder**
- Goal of accommodation is to provide equal access to the educational environment and curriculum
- We need to provide both accommodations AND treatments
- Examples: FM systems, preferential seating, speaking slower, have a note taker
  - These are all accommodations that will **not** treat the APD problems

Lucker's Research on Noise Distractibility

- How many children with APD have auditory distractibility
  - Auditory distractibility based on APD (not attention deficits) affects the child's abilities to understand speech in the presence of background noise
- Results for 200 Children with APD
  - ~25% failed at least two tests of speech understanding in noise (out of four measures)
  - Thus, overwhelmingly, most children with APD do **not** have problems with background noise
  - Then, why are so many children dx with APD given FM systems?



Accommodations

- Preferential Seating
  - What is the preference?
  - Better to spell out what the child needs
- Clear indicators of changing topic
  - Many children with APD lag behind and are not aware of when topics change
- Reduce the LOAD!

Accommodations

- Pre-teaching
  - Key word is **TEACH**!
  - Teach vocabulary, language, underlying concepts
- **Accentuate the positive !**
  - Children always respond better to positives than negatives

Treating APDs

- We need to provide both **practice** and **development of skills/strategies**
- Most commercially available products only provide practice
- It's up to the professional to teach the skills or strategies

Treatment for Auditory Hypersensitivity

- The problem with hypersensitivity
  - See *Autism Science Digest* April 2012
  - See *Focus on Autism March 2013*
- Lucker identifies auditory hypersensitivity as an emotional based problem
- Treat the emotional system
  - Systematic Desensitization
  - Listening Therapy

Systematic Desensitization

- It is based on behavioral therapy or behavior modification
- Give control to the child
- Systematically introduce the annoying sounds
  - Focus on length of hearing the sound
  - Intensity of the sound
  - Work from least to most annoying

Listening Therapy

- Lucker's recommendation and research has been with
- The Listening Program
  - www.thelisteningprogram.com
  - www.advancedbrain.com
- Also, use of environmental music
  - Sound Health Series from Advanced Brain Technologies

ABT ADVANCED BRAIN TECHNOLOGIES

Earobics

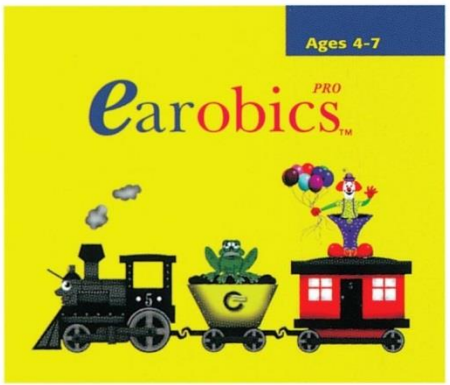
- For auditory phonemic awareness *practice* (Phonemic Extraction)
- Different levels or versions
  - For children (step 1 and step 2)
  - For adolescents and adults
  - Inexpensive
  - Home and Professional versions
- www.earobics.com or www.cogcon.com
- Hear Builder by Super Duper Inc.
  - Phonological Awareness program

Lucker's Research on Earobics

- 2 classes = Experimental (one in each school)
  - Children used Earobics 20 min./day for 3 months as a center
- 2 classes = Control (one in each school)
- Evaluated changes in reading readiness test scores (school district criterion referenced test
- Results: Children who did Earobics showed a one standard deviation greater improvement than the control group

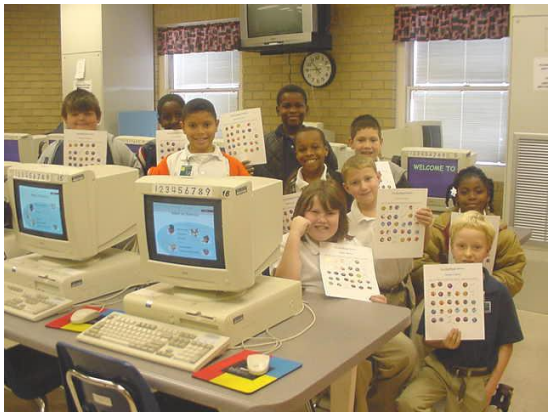
More Research on Earobics

- Subjects middle school through HS students with primary dx of ED/LD
- Did Earobics once a day along with the regular reading program at the school
- No significant improvements in phonics noted for pilot group of 25 students
- BUT, significant improvement in *reading comprehension*



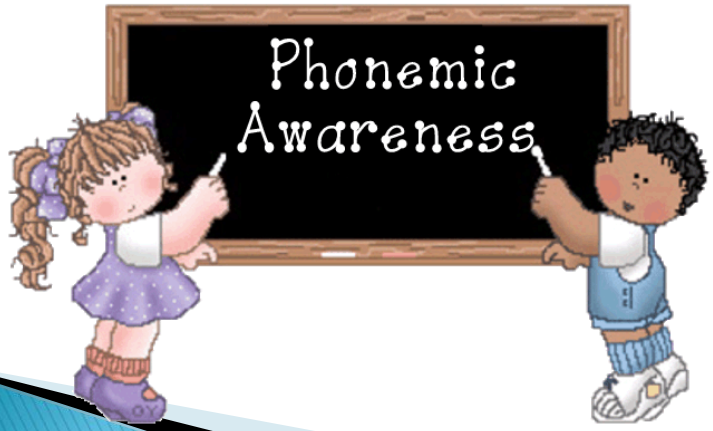
Fast ForWord

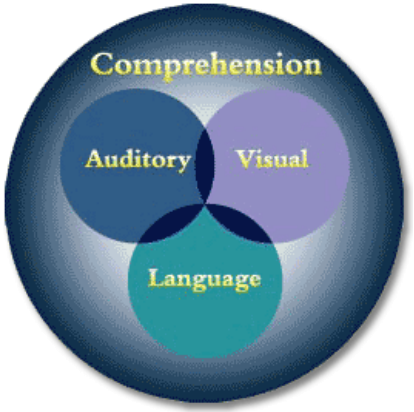
- Lucker's research (2007)
  - Only change in two of 6 measures of temporal processing on two different tests and only for the low frequencies
  - Improvements found in integrative processing



Lindamood-Bell Programs

- LiPS
- Visualizing & Verbalizing (V/V)
- www.lindamoodbell.com
- www.ganderpublishing.com





An Organization Strategy

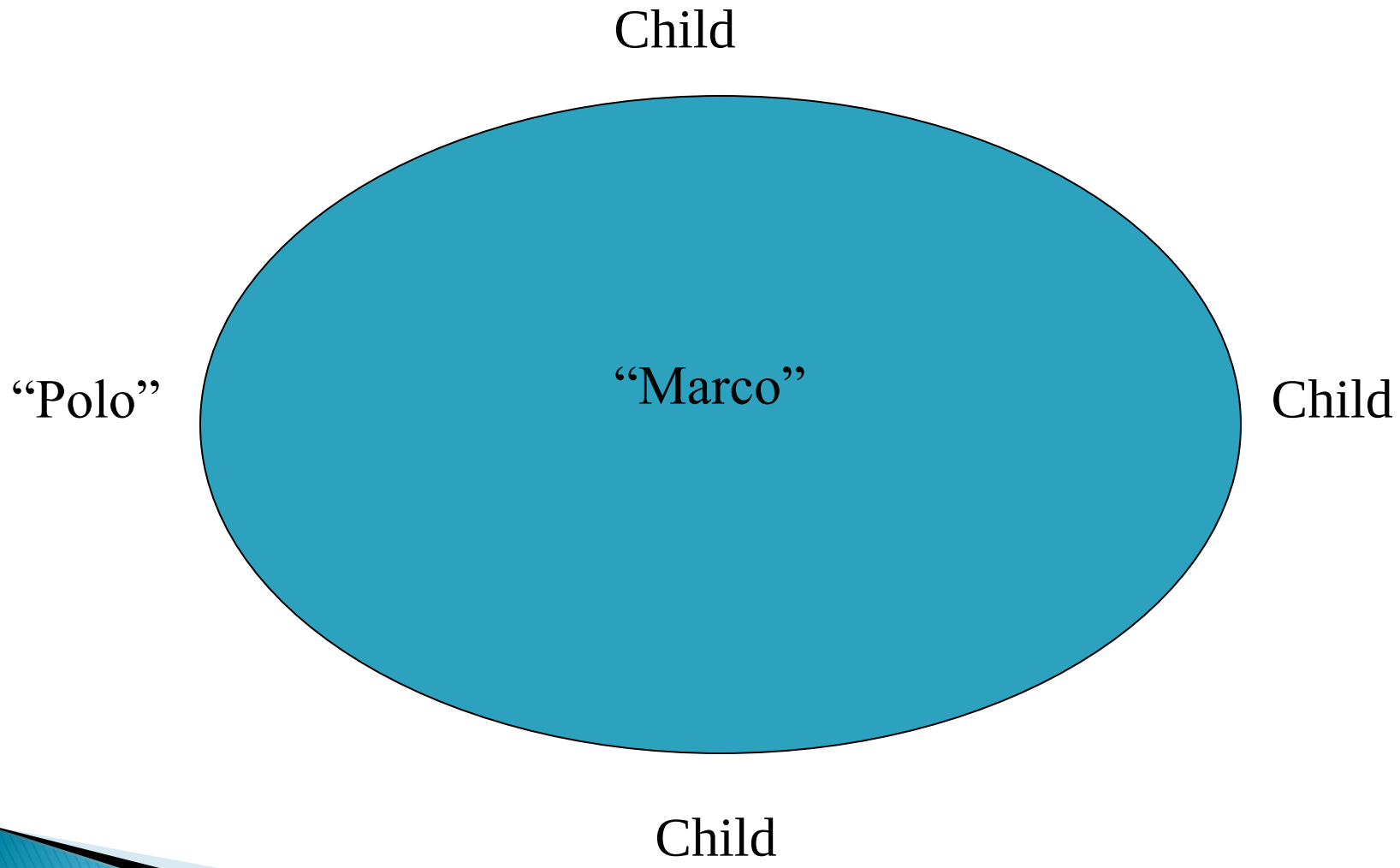
- Using the "WH" strategy from V/V, I developed a ***graphic organizer*** called **The Five Columns**
- Use this graphic organizer for forming and expanding sentences
- This strategy can be used in taking notes on what the child is reading or to what the child is listening

Who? What?	What's Happening? What did (subject) do?	Where?	When?	Why?
Nouns, subject	Verbs, actions, also "is"	Place, locations	Time	Reasons, because
Person, thing, animals	Action words and the "is" equals	In, on, under, etc.	Hours, days, seasons, etc.	Go back to action tell why it occurred
Descriptives are the adjectives = which?	Descriptives are the adverbs = how?	Descriptives are the adjectives = which?	Descriptives are the adjectives = which?	Links to a new sentence

Activity for Listening in Noise/Auditory Distractibility

- The goal here is to teach the child to FOCUS on the primary speaker regardless of what are the background distractions
- Child has to localize the primary source of speech, face the direction of that source
- Play the game as a variation of the “Marco Polo” game

Marco-Polo Activity



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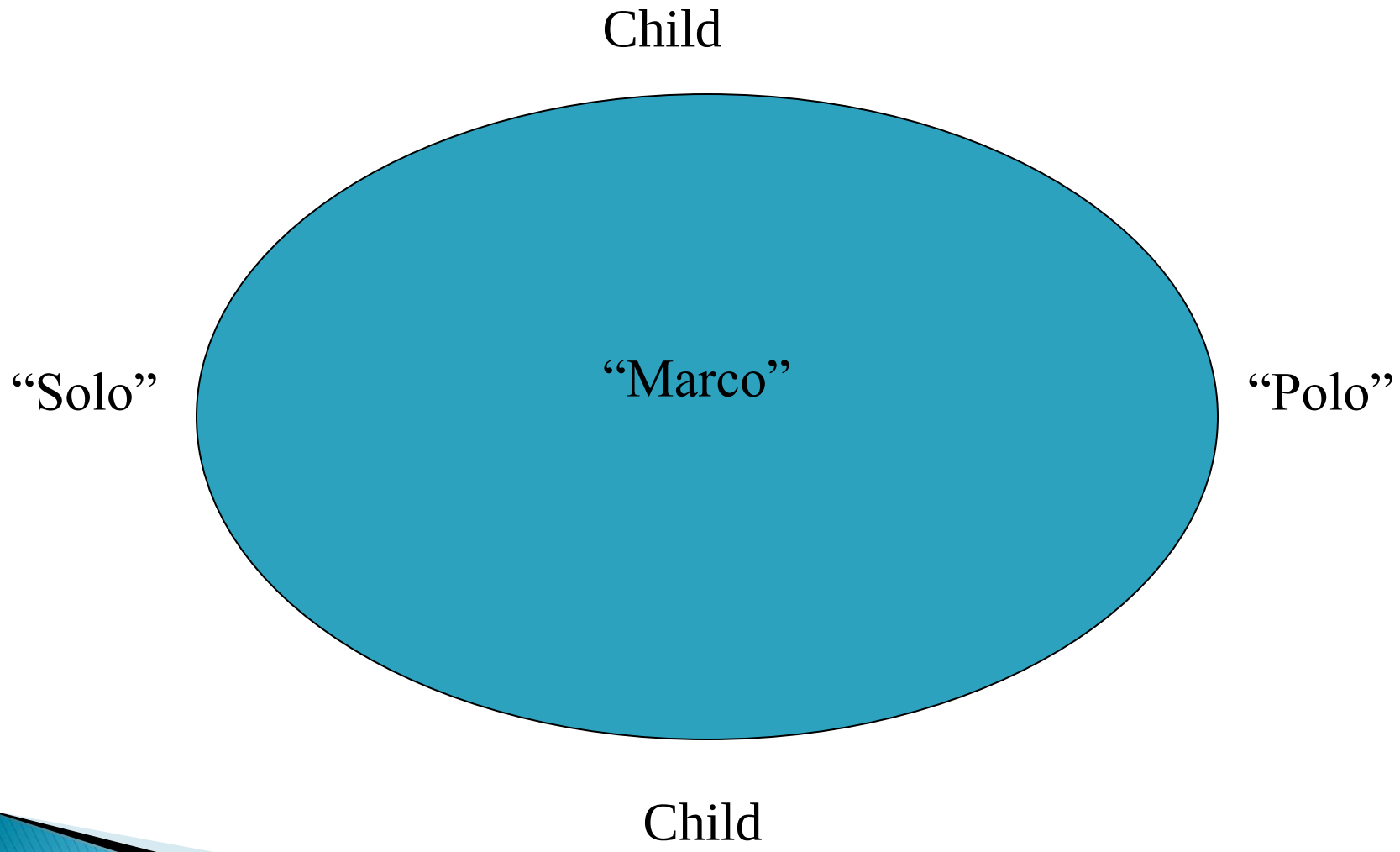

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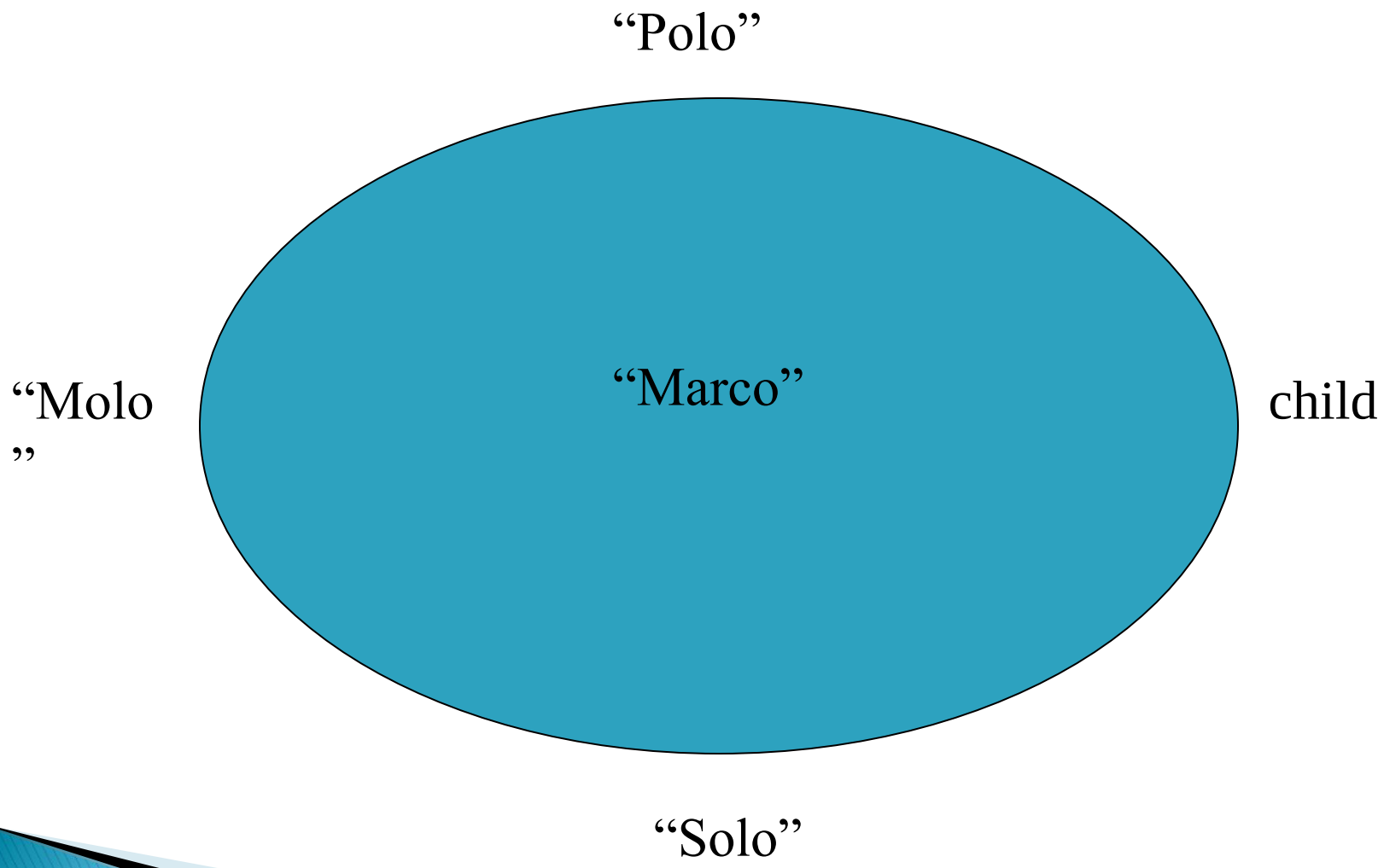

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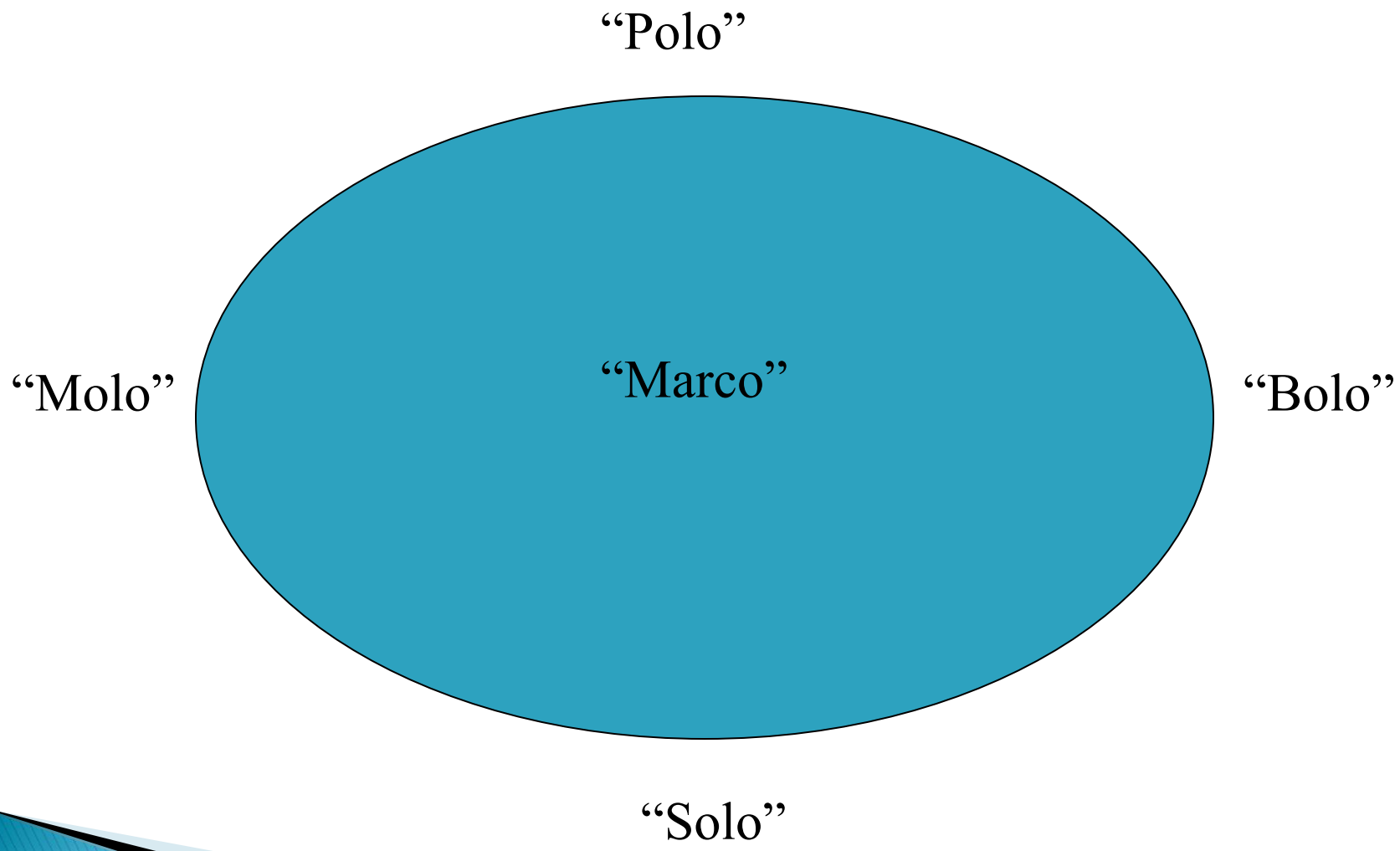

Keep In Touch

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