

## Test of Auditory Functioning (TAF) by Donald M. Goldberg

The TAF includes 19 subtests, ranging from suprasegmental discrimination through listening comprehension with competing noise/messages, and is based, in part, on the “auditory hierarchy” and landmark work of Norman Erber.

The TAF comes with a 172-page easel, and a small USB drive with all required audio clips, calibration tone, score sheets, manual including detailed administration instructions, AND will be updated with NOW AVAILABLE links to YouTube videos. The videos demonstrate (1) calibration, along with samples of the administration of each of the 19 subtests -- (2) Subtests 1 through 8; (3) Subtest 9-12 (Pattern Perception); and (4) Subtests 13-19 (that include word and phrase recognition, along with Sequencing 3 Events and Listening Comprehension in Quiet and in Noise).

AVAILABLE NOW: [bluetreepublishing.com](http://bluetreepublishing.com)

EAA Code before finalizing on-line order: EAA2024

Other questions: [dgoldberg@wooster.edu](mailto:dgoldberg@wooster.edu) and/or [DMGdmg7779@gmail.com](mailto:DMGdmg7779@gmail.com)

### Follow-Up Questions from EAA Webinar on March 5, 2024

#### Administration-Based Questions

Q: When you administer the LTL subtests, do you start by pointing at each picture and producing the stimuli so they know what they are listening for (e.g., they are listening for "choo-choo" not "train")

Q: Would there be an ability to familiarize a student with the vehicle sounds on subtest 8 before testing them on it? When testing a student using the recordings of the vehicle sound imitations, they really struggled associating them with the pictures in subtest 8. Or would the vehicle sounds be able to be recorded as actual vehicle sounds, similar to the environmental sounds (e.g phone ringing, vacuum on) ?

Q: Are the LLS and vehicles and environmental sounds on an audio file? If so, one might use live voice if the child is not able to choose from a set of 6 or 9 pictures (to decrease the number in the set)?

Q: How do you account for cultural differences in the way for example people associate sounds/ different foods eaten etc.

**A: The TAF manual is quite comprehensive with administration instruction and details for the TAF. The Instructions for the administration of each subtest is printed in a red-lined box for the Examiner to read verbatim to the Guest. Each Subtest has detailed Subtest Instructions in the Manual (pages 7 through 13). Recommendations explain, for example, what the Guest will hear in Subtest 1Ar for the race car “vroom” and what he/she/they will hear for the rabbit, “hop hop hop”; the Guest will hear “Hello, my**

name is Reagan” from a Lady or Woman (Female/Mommy) OR a Man (Male/ Daddy) for /Subtest 3; the labeling of each of the 9 familiar/environmental sounds about to be heard in Subtest 5; to what each of the Ling Six Sounds are (Subtest 6); explaining to the Guest for example that the Duck goes, “Quack, quack, quack” and the sheep says “baaa baaa” in Subtest 7 and the boat goes “puh puh puh” and the airplane goes “ahhh ahhh” in Subtest 8; along with pointing out each of the words and word patterns for the varied stimuli within the pattern perception subtests (9 through 12); and instructions continue for each of the remaining subtests.

Q: Can the test be administered remotely?

**A: The TAF was not developed for remote administration. However, provided the calibration requirements could be satisfied AND the easel images were clearly in view for the Guest to see and make his/her/their selections known to the Examiner – remote testing seems like a possibility to attempt.**

Q: How do you anticipate TOD to use this information? It seems like it should be administered by an audiologist.

Q: Is this always done by audiologists or is it sometimes done by teacher of the deaf?

**A: The TAF was developed for a range of professional colleagues, including Educational Audiologists, SLPs, Teachers of the Deaf, LSLS Cert. AVTs and LSLS Cert. AVEs, among others – all of whom are welcome to consider this testing option to help determine the auditory functioning of the children they are teaching who are deaf and hard of hearing.**

### **How long does the TAF administration take?**

Q: I understand you are not doing all 19 subtests for a child; On average, how long does it take to administer a test for a student?

Q: Due to the administration time what would be the best way to administer without being confounded by listening fatigue?

Q: How long does the TAF take to administer?

**A: During the field testing, provided I began at an appropriate starting point, most TAF testing, on average, was about 15 minutes (+ ~ 5 minutes). No Guest would be administered all 19 subtests.**

### **Where to start?**

Q: What are your recommendations on which subtests to start with or which to complete in a session?

**A: Calibration FIRST – one-time only requirement prior to the administration of your first Subtest administration (detailed in the TAF manual on page 3, with Figure 1 provided).**

***“Where to Begin Testing --- Which Subtest -- is detailed on page 4 of the TAF Manual. The starting point recommendations include the Guest with very limited auditory skills and abilities; Guests who know the Ling Six Sounds or are familiar with the Learning to Listen Associated Sounds for Animals and Vehicles; children who are likely at the Pattern Perception level; Guests who have basic word recognition skills (“Show me bed”) or phrase recognition skills (“Show me dirty shoe”); through Guests Sequencing of 3 Events skills or with Listening Comprehension skills -- in Quiet or in the presence of competing signals/noise. All these later Subtest tasks are described and should prove helpful to the Examiner in order to provide recommendation regarding which Subtest is likely the appropriate starting point for a particular Guest.***

**When to stop?**

**Guidelines are provided in the TAF manual – primarily at about 70% pass criterion level. For Subtests 13 through 19 -- the specific PASS criterion level is listed (see TAF Manual page 5). In general, two consecutive subtest “Fails” is an appropriate end or ceiling point.**

### **TAF for Children with “processing” challenges?**

**Q: Would this be something to try with kids with typical hearing to check for the functional impact of suspected auditory processing deficits?**

**Q: What are your thoughts on using your test with central auditory processing students?**

**A: Although not designed or developed for that sample population, after collecting some additional data – the TAF has potential to be considered for administration to these children. Notably, the final subtests could be used to compare sequencing and listening skills of Guests in Quiet and see how the introduction of noise (first at +10 SNR, then +5 SNR, and ending the TAF with 0 SNR), may prove to be most illustrative of noise’s impact on many Guests.**

### **Additional Q&A**

**Q: What kind of recommendations are in the test manual for learners who's auditory functioning is severely impacted?**

**A: Recommendations for follow-up intervention begins with addressing the area/s of difficulty demonstrated at the time of TAF baseline testing. A future publication is planned for a host of additional intervention recommendations to support colleagues in the field.**

Q: Are their norms ? based on those w typical hearing? hearing age? or hearing loss type/ degree? Or is this more a way to individually check a child's unique progress ?

**A: Test is criterion-based and norms based on a standardized population sample were not systematically determined.**

Q: At what age would you want to switch to adult subtests when available?

**A: ADULT Subtests 1B and 6B: Any Guest who is older and might be offended by the images or simply does not need a race car for “vroom,” can be administered Subtest 1B with a line for ahhh versus three dots for ah ah ah; and those Guests who do not need the ice cream cone image for the Ling sound /m/ -- can be offered Subtest 6B versus 6A.**

Q: It seems that most of the time listening and spoken language therapy is recommended for children with CI's, but not hearing aids. Do you know why that is? Can you share any research around efficacy of lisls therapy for children with hearing aids?

**A: THE TAF IS NOT JUST FOR KIDDOS WITH CI/s!:** My field testing subjects made use of a variety of hearing sensory technology – not just CI/s. As many SLPs, Educational Audiologists, Teachers of the Deaf, and other clinicians have the joy of seeing guests with two Hearing Aids, two Cochlear Implants, 1 HA and 1 CI, osseo-integrated bone conduction systems (surgically placed or on a soft band) – ALL are appropriate candidates for the administration of the TAF for baseline testing and on an annual basis!

Q: Follow-up question - are you concerned about potential distortion with built-in speakers of laptops?

**A: Testing in a quiet space is recommended but NO SOUND-TREATED BOOTH is required! Initial calibration to verify the TAF is always administered at the presentation level of 76 dBA is required. However, should the signal from the Audio Files be distorted because one's computer speaker/s – that would of course compromise the validity of the testing.**

Q: How would you recommend reporting or writing the report on this test after performing it? are there any sample reports?


**A: REPORT WRITING: Page 10 of the downloadable Score Sheet provides a SUMMARY DOCUMENT that can easily be adapted for report writing. A maximum score of 200 is possible. Once testing is underway, provided the Guest passes his/her/their first Subtest one administers, the Guest is given credit for all of the prior Subtest items (see page 13 of the TAF manual for scoring details).**

Q: Would this test eliminate the need to use an Functional Listening Eval?

**A: Colleagues are encouraged to continue to complete other measures they feel are clinically and educationally appropriate, including the Functional Listening Evaluation. The TAF is unique and believed to be a robust, hierarchically arranged measure of auditory functioning like no other tool. However, one's clinical judgment in providing additional functional data is still strongly encouraged.**

Q: How do you account for cultural differences in the way for example people associate sounds/ different foods eaten etc.

**A: CULTURAL DIFFERENCES: The question is a good one and may need some re-evaluation of the various possibilities of sounds included and attention to the semantic differences that exist culturally and in varied geographic regions.**



**The TEST OF AUDITORY  
FUNCTIONING (TAF): A  
Criterion-Based Test for Toddlers  
Through School-Aged Kiddos Who  
Are Deaf or Hard of Hearing**


**Donald M. Goldberg, Ph.D., CCC-SLP/A, LSLC Cert. AVT**

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**EAA Webinar, March 5, 2024**

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**Disclosures**

Donald M. Goldberg, Ph.D., CCC-SLP/A, LSLC Cert. AVT

**Disclosures**

- Receives salary from the College of Wooster (Wooster, OH)
- Receives compensation as a Contract Staff/Professional Staff member of the Cleveland Clinic Foundation's Head and Neck Institute, Section of Audiology, Hearing Implant Program
- Past President, AGBell Association for the Deaf and Hard of Hearing
- AGBell Rep. to the Joint Committee on Infant Hearing (JCIH)
- AGBell Rep. to the Council on Education of the Deaf (CED)
- Past President, AGBell's Academy of Listening and Spoken Language
- Advisory Panel member of *Decibel Therapeutics*
- Author, *Test of Auditory Functioning* – Blue Tree Publishing (Edmonds, WA)

2




Topics

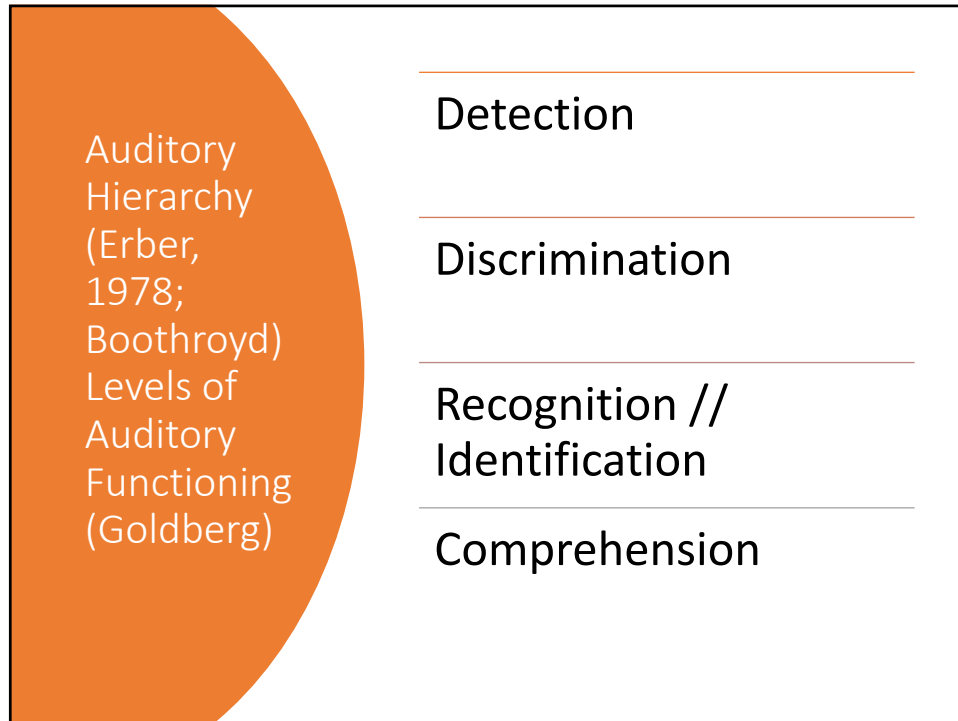
- Audiology Rocks
- Levels of Auditory Functioning
- Assessment of Speech Perception (SRT, Word Recognition, & Beyond)
- Speech Acoustics
- The *Test of Auditory Functioning* (TAF) (“filling a void” in the assessment of speech perception and audiology)

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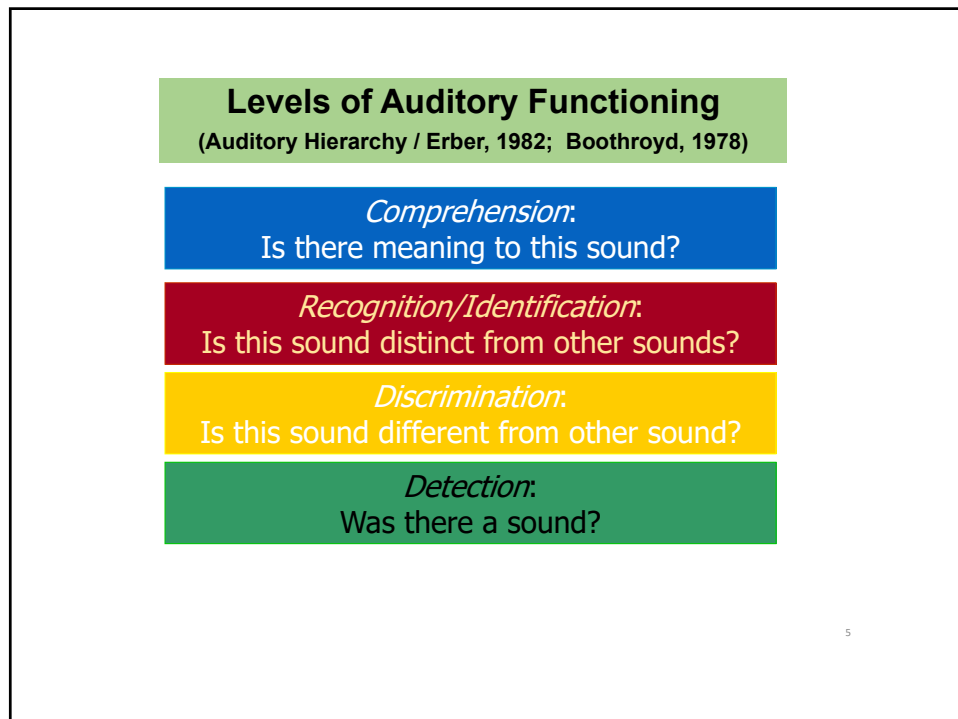
**Audiology:**  
The Foundation of Auditory Teaching for  
Listening & Spoken Language  
Development



4



5



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## Auditory Assessment

- **Infant-Toddler Meaningful Auditory Integration Scale (IT-MAIS)**

(Zimmerman-Phillips, Osberger & Robbins, 1997)

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SDT / SAT

Stimuli:

Child's Name?

Where's

Mommy?

Raspberries ?

Not Ear-Specific

8

SRT

---

Spondee Stimuli

---

Materials: Picture Plate /  
Props

---

Closed Set vs. Open Set

---

Threshold or MRL/s


---

May be non-ear-specific

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Word Recognition

- \*Varies depending on stimuli
- \*Closed or Open set
- \*Varies depending on Presentation Level
- \*Varies depending on testing in Quiet or in Noise (at varying SNR/s)



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## Word Recognition

Vocabulary Level (receptive vocabulary)

Stimuli: typically limited high frequency acoustics\

Closed Set versus Open Set

NU-CHIPS

WIPI

Open Set NU-CHIPS or WIPI

PB-K

OTHER Measures

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N CHIPS



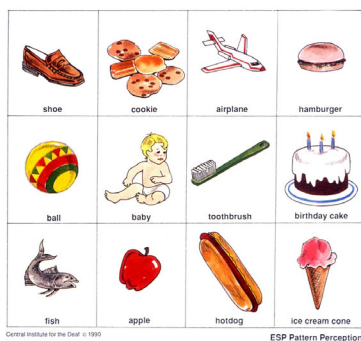
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## “Other” Measures

- GASP!
  - LittEars
  - PEACH
  - Baby Bio/Pediatric AZ Bio
  - SERT
  - MAIS
  - DIAL
  - ELF
  - CHILD
  - MUSS
  - CRISP
  - TEACH
  - SIFTER (Pediatric/Secondary)
  - FAPI
  - CASLS
  - COW
  - CHAPPS
  - TAPS-3
  - SCAN-3
  - Gardner words
- q
- \* Mr. Potato Head Task
  - \* PSI
  - \* COT
  - \* LSSKSI
  - \* CNC
  - \* HINT-C
  - \* LNT
  - \* MLNT
  - \* BKB / BKB in Noise
  - \* LIFE
  - \* Checklist of Auditory Communication Skills
  - \* APAL
  - \* SPICE
  - \* CHAT
  - \* The Listening Test (Pro-Ed)
  - \* Listening Comprehension Test-2
  - \* LCT-Adolescent
  - \* SIN / QuickSIN

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## Early Speech Perception (ESP)



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# Auditory Assessment

- Ling 6/7  
Sound Test
- Early Speech  
Perception  
(ESP)

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## Ling Six (Seven) Sound Test

ah (/a/)

oo (/u/)

ee (/i/)

sh

s

m

(Ling & Ling, 1978)

Consider  
"NO SOUND"  
as the  
7<sup>th</sup> Sound

(the late Rosemarie Drous,  
Formerly of the  
Helen Beebe Speech & Hearing  
Center)

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Daniel Ling



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## Ling Sound Check

- Clinical Application
- “Good” Mistakes
- “Bad” Mistakes
- Patterns of Error/s ?

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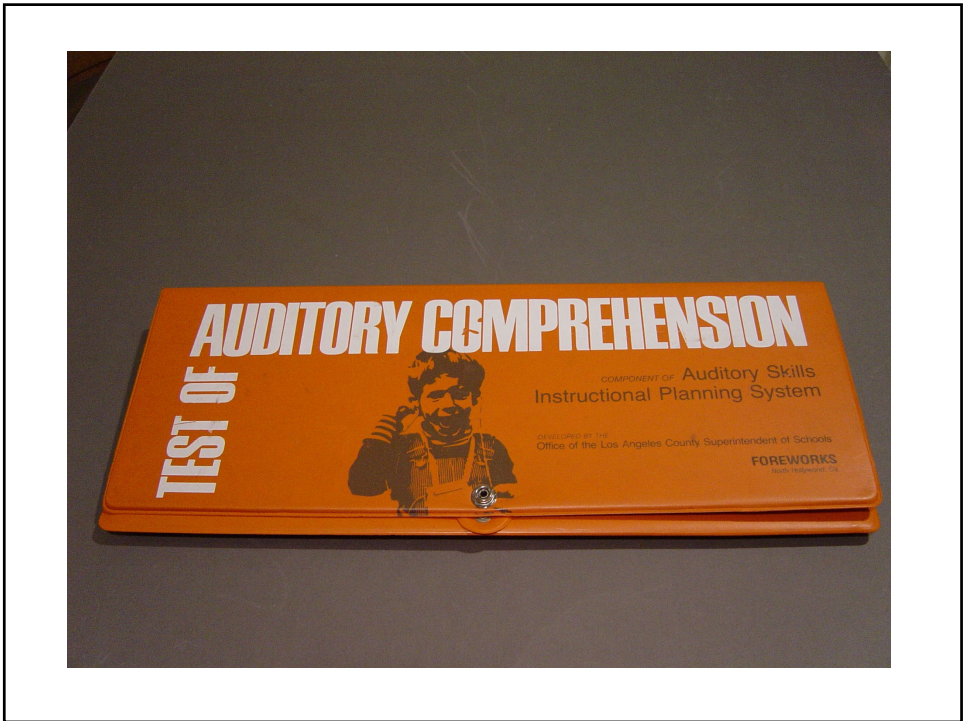
Other  
"Test  
Measures"

**Auditory Perception Test  
for the Hearing Impaired**  
3<sup>rd</sup> Edition  
By Susan Allen  
Plural: **\$299.95**

**Developmental Test of  
Auditory Perception**  
By Reynolds, Voress, &  
Pearson  
Pro-Ed: \$222.00

**The Listening  
Comprehension Test-2**  
Pro-Ed: \$190.00


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Auditory Skills Instructional Planning System

# TEST OF AUDITORY COMPREHENSION



NAME	SEX <input type="checkbox"/> M <input type="checkbox"/> F	BIRTHDATE	C.A.
SCHOOL	EXAMINER	TEST DATE	
TEACHER	CLASS SETTING		

DATE OF MOST RECENT HEARING TEST	TYPE OF LOSS
RE: 500 Hz	1000 Hz
LE: 500 Hz	1000 Hz
2000 Hz	2000 Hz
PTA: _____	dB HL
SPEECH AUDIOMETRY	PTA: _____
PREVIOUS TAC RESULTS DATES	
OTHER TEST RESULTS DATES	
TYPE OF AMPLIFICATION	
WORN DURING TEST? <input type="checkbox"/> Yes <input type="checkbox"/> No	COMMENTS
SETTING RE LE BIN	

TEST CONDITIONS

REASONS FOR TESTING

COPY OF REPORT TO

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## Test of Auditory Comprehension (TAC)

(Trammell, 1981)  
(Foreworks Publishers)

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## TAC "Users" in the Audience?

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## TAC & EAA Critique

Note: Background information provided to DMG from Dr. Karen Anderson / March 2018 – MANY THANKS!

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In May 2011, board members of the Educational Audiology Association were requested to survey their membership “regarding a possible replacement for the TAC.” A survey was developed and completed by 43 EAA members (all familiar with the TAC)

### Findings:


TAC’s screening section needed modifications

Preferred format of CD vs. audio cassette!

Test stimuli on tablet or APP

Address the presence of competing messages (0 SNR – too difficult!)

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### DMG Critique – What to Address:

- **Cassette to CD** (or audiofiles on a USB drive)
- **Images** (needed MUCH modernization)
- **“Sexist” content issues**
- **DEI** (also – much attention needed)
- **Hierarchical order.**  
(basic discrimination; f0; Ling Sounds; Familiar Sounds; LTL Associated Sounds; Pattern Perception)
- **Functionality**
- **Varying SNR/s** (before 0 SNR)

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Need to Know Acoustics!

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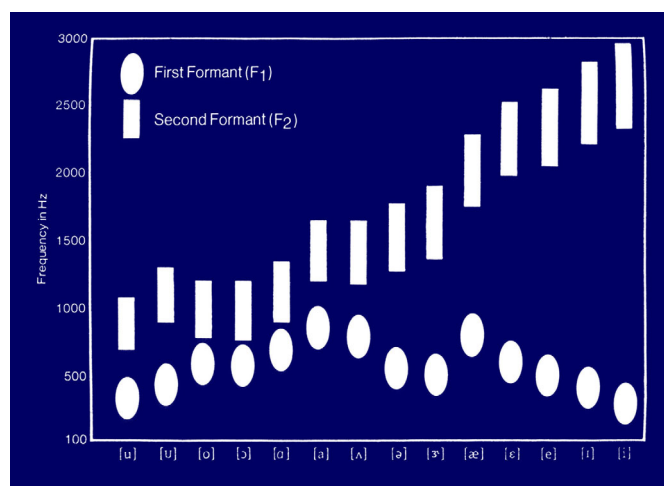
## Vowels

- Perception of vowels results from the identification of First Formant (F<sub>1</sub>) and Second Formant (F<sub>2</sub>)

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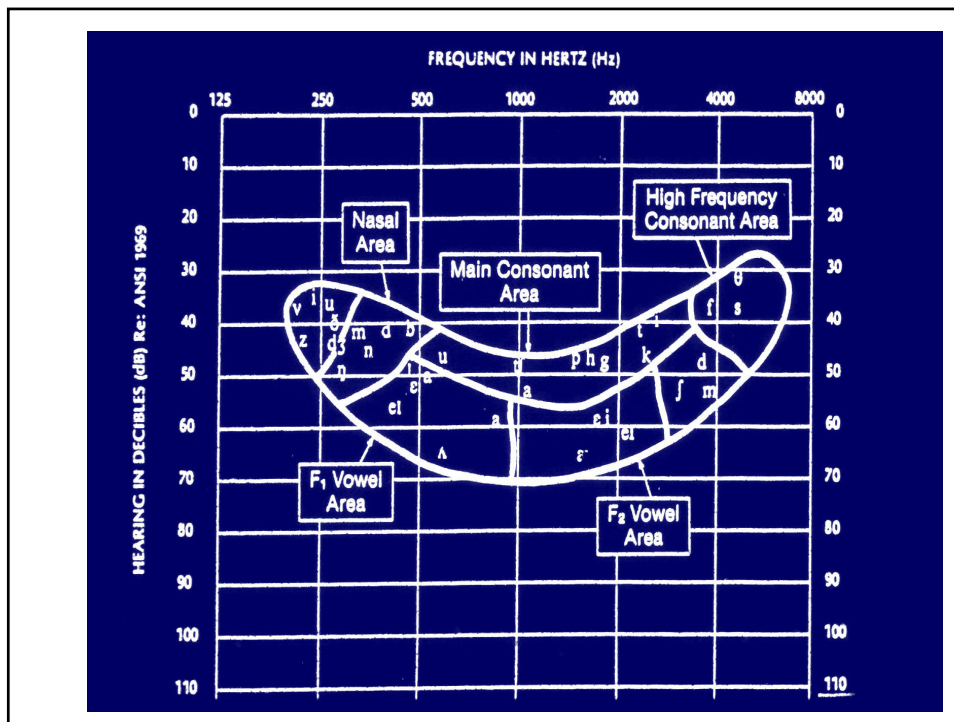
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Ling &amp; Ling 1978

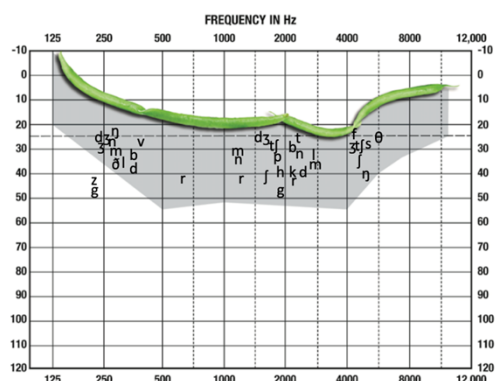
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## Speech String Bean with Consonants



www.JaneMadell.com and www.DonaldGoldberg.com

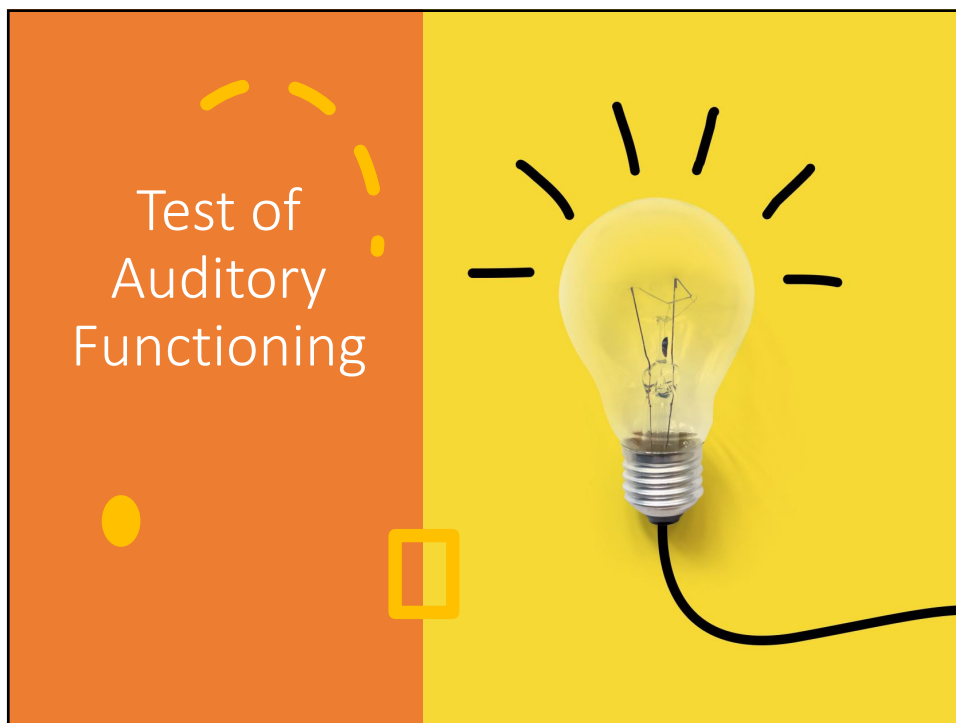
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Auditory-Based Teaching Does **NOT** Merely Mean Putting An Acoustic Hoop In Front of Your Mouth!

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## Support from The College of Wooster

- Sophomore Research Assistants
- Research Leave Spring 2015 to Australia
- Research Leave Fall 2019 for Field Testing
- Henry Luce Fund support

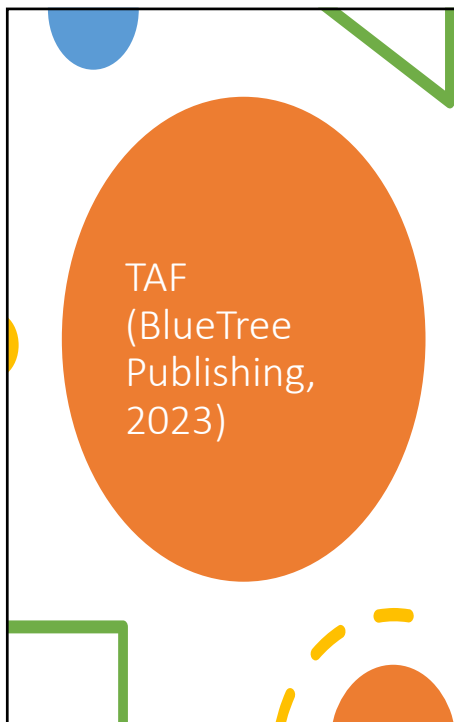


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Field Testing: Fall2019 / Spring Break 2020.  
(and then the Pandemic!)



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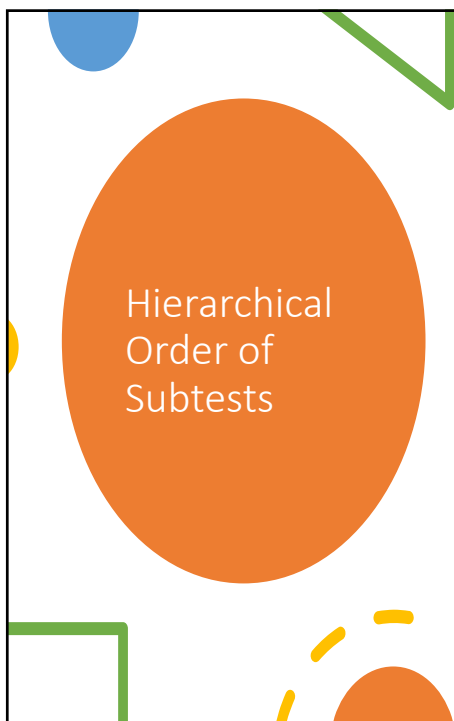
TAF  
(BlueTree  
Publishing,  
2023)

The *Test of Auditory Functioning* (TAF) is a computer-based **criterion-based measure** for **children who are deaf or hard of hearing, from approximately 2 to 13 years of age, using a range of hearing sensory technology**, including hearing aids (HA/s), cochlear implants (CI/s), bone-anchored devices, or a combination of 1 HA and 1 CI.

Field testing of ~1000 images and audio clips, resulted in the finalization of the TAF. Data collected from over 125 English-speaking preschoolers through 13-year-olds, on four continents

Easel-based test with audio on USB drive

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Hierarchical  
Order of  
Subtests

ST 1 – Duration Discrimination (Pediatric & Adult)  
ST 2 – Pitch Discrimination  
ST 3 – Fundamental Frequency Discrimination (Male/Female)  
ST 4 – Fundamental Freq. Recognition (Male/Female/Child)  
ST 5 -- Environmental/Familiar Sounds Recognition  
ST 6 – Ling Six Sound Recognition (Pediatric & Adult)  
ST 7 --- Learning to Listen: Animals  
ST 8 – LTL Vehicles  
ST 9 – Pattern Perception (1 v. 3-syllable words)  
ST 10 – Pattern Perception (1- v. trochees v. spondees v. 3-syllable words)  
ST 11 – Spondee Recognition  
ST 12 – 1-Syllable Word Recognition

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Hierarchical  
Order of  
Subtests

- ST 13 – One Critical Element
- ST 14 – Two Critical Elements
- ST 15 – Sequencing Three Events  
(Quiet)
- ST 16 – Listening Comprehension  
(Quiet)
- ST 17 – Sequencing Three Events  
(+10 Signal-to-Noise Ratio/+10 SNR)
- ST 18 – Listening Comprehension  
(+5 SNR)
- ST 19 – Listening Comprehension  
(0 SNR)

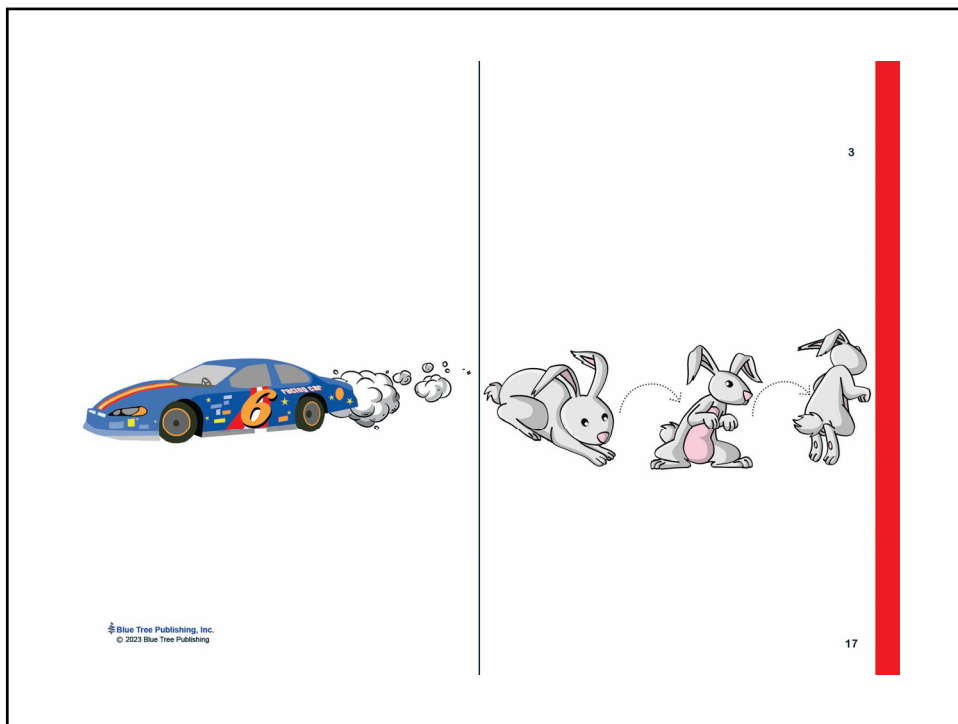
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Subtest 1  
1A – Pediatric  
1B -- Adult

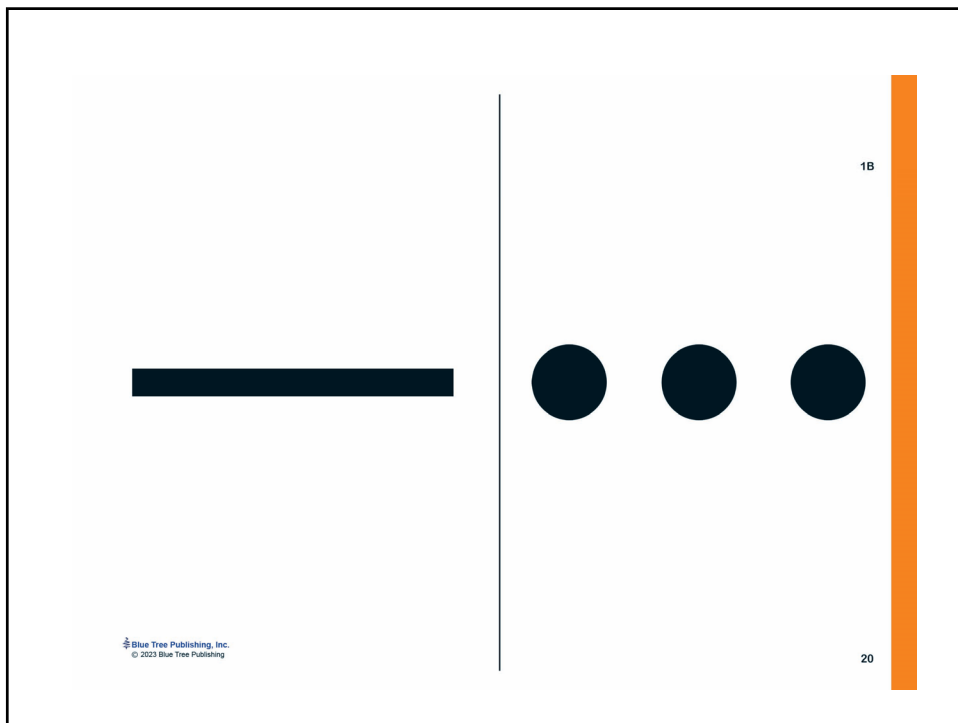
**Duration Discrimination**

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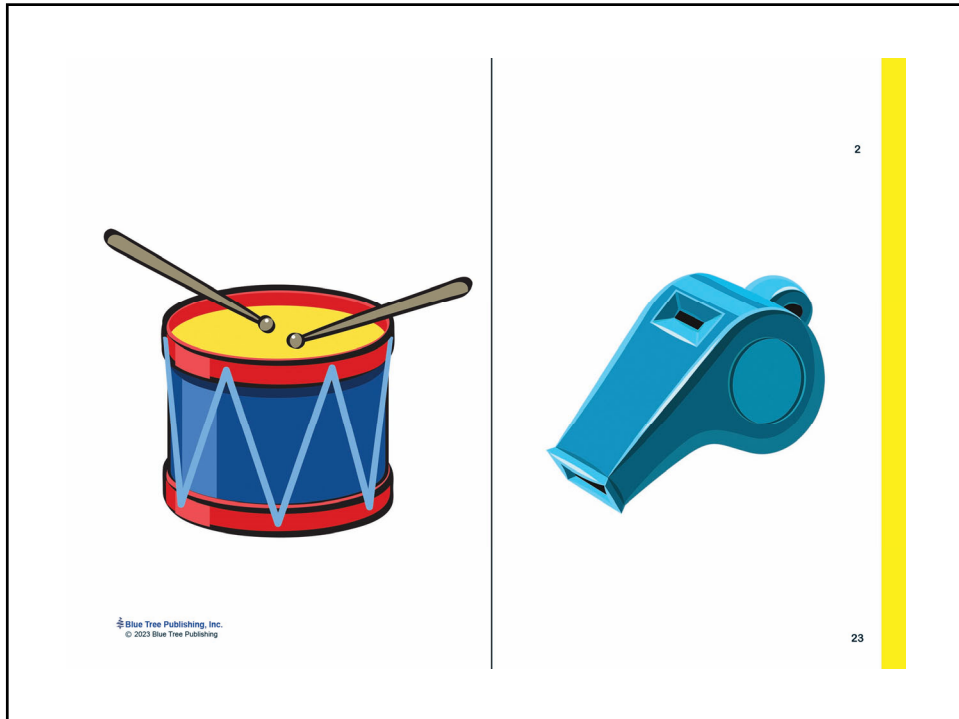


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Subtest 2

**Pitch Discrimination**

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Subtest 3

**Male versus Female**  
**Fundamental Frequency Discrimination**

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# Subtest 4

## Male versus Female versus Child Fundamental Frequency Recognition

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Subtest 5

**Environmental/Familiar  
Sounds Recognition**

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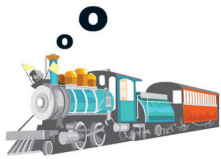


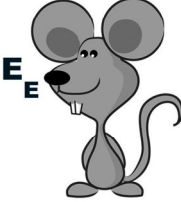

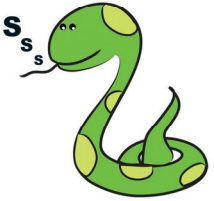
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Subtest 6  
6A – Pediatric  
6B -- Adult

**Ling Six Sounds**

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 <p>O</p>	 <p>m m</p>	 <p>AH</p> <p>6A</p>
 <p>E E</p> <p><small>Blue Tree Publishing, Inc. © 2023 Blue Tree Publishing</small></p>	 <p>SH</p>	 <p>S s s</p> <p>37</p>

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<b>OO</b>	<b>Mmm</b>	<b>AH</b>
<b>EE</b>	<b>SH</b>	<b>Sss</b>

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6B

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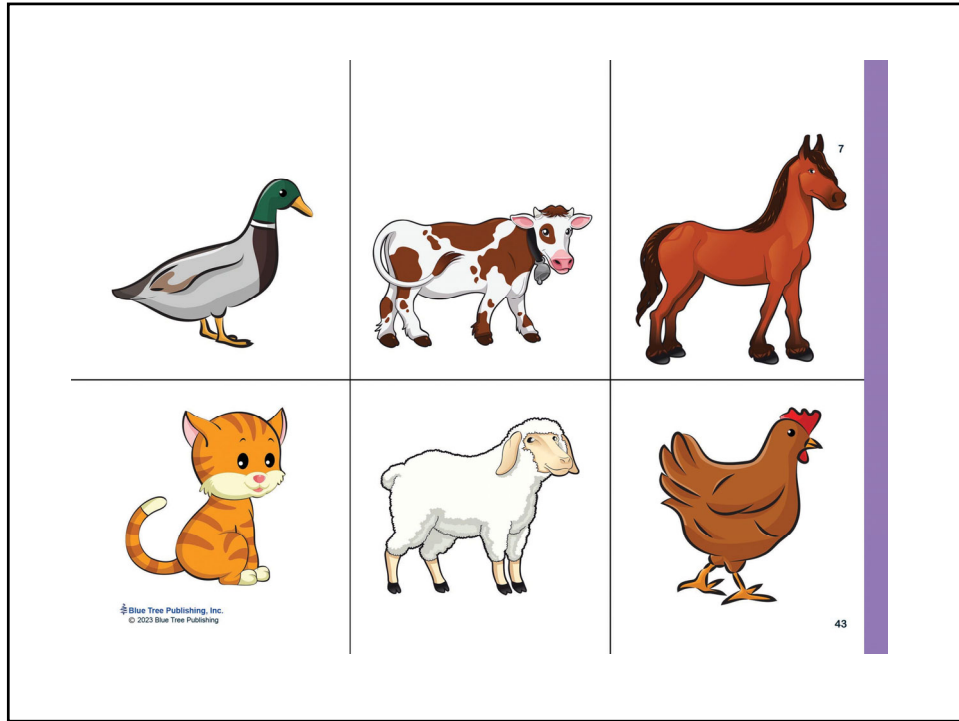
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Subtest 7

**Learning to Listen Associated Sounds**

**Animals**

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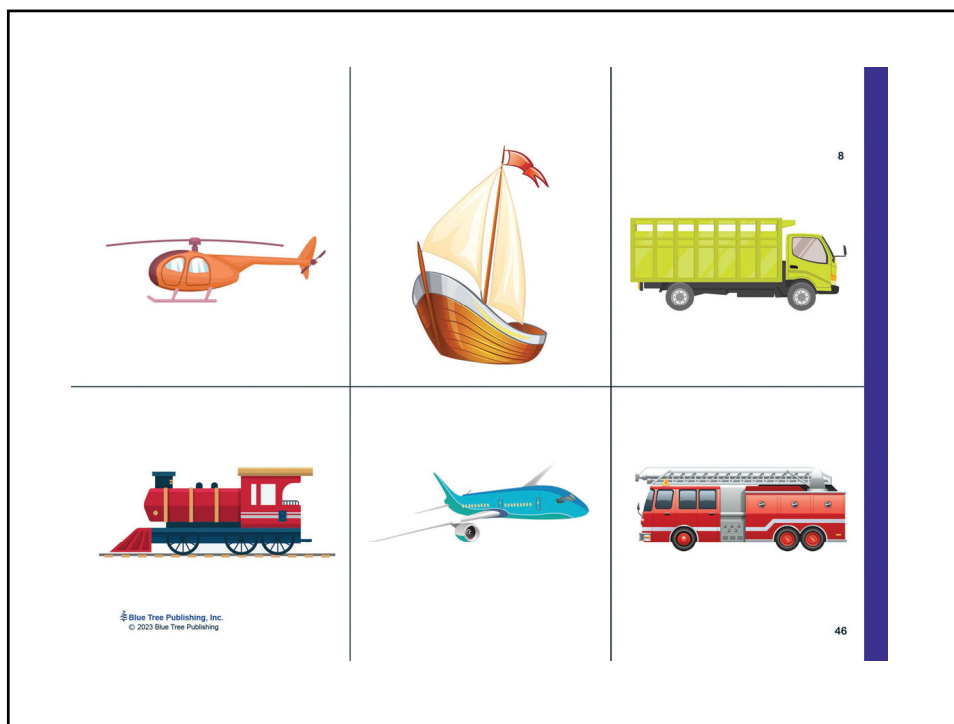
Subtest 8

**Learning to Listen Associated Sounds**

**Vehicles**

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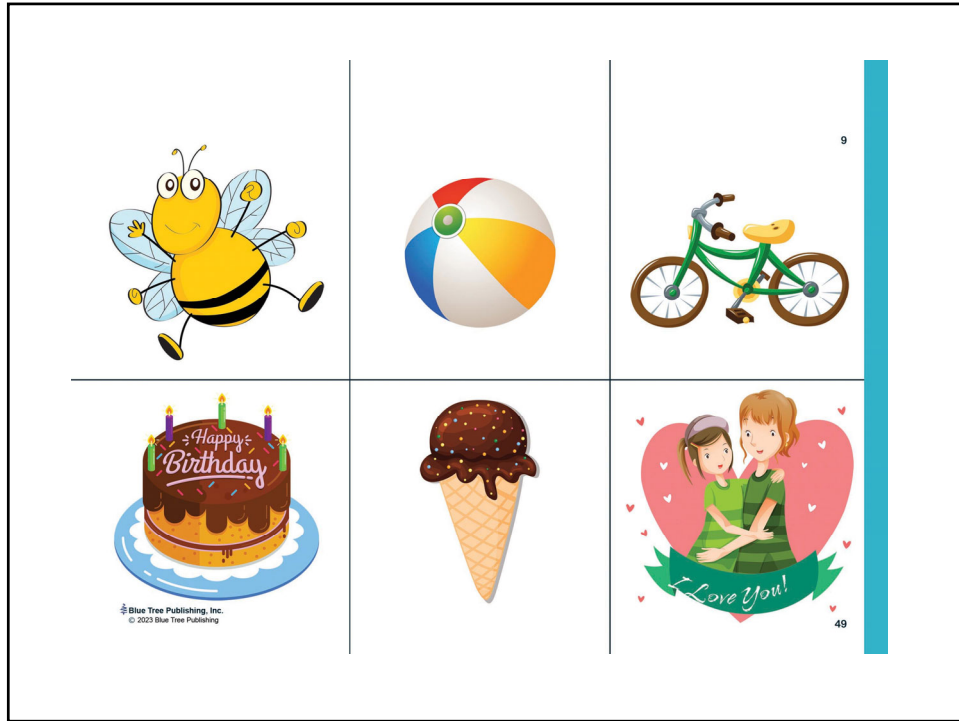
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Subtest 9

**Pattern Perception**

**1-Syllable versus 3-Syllable Words**

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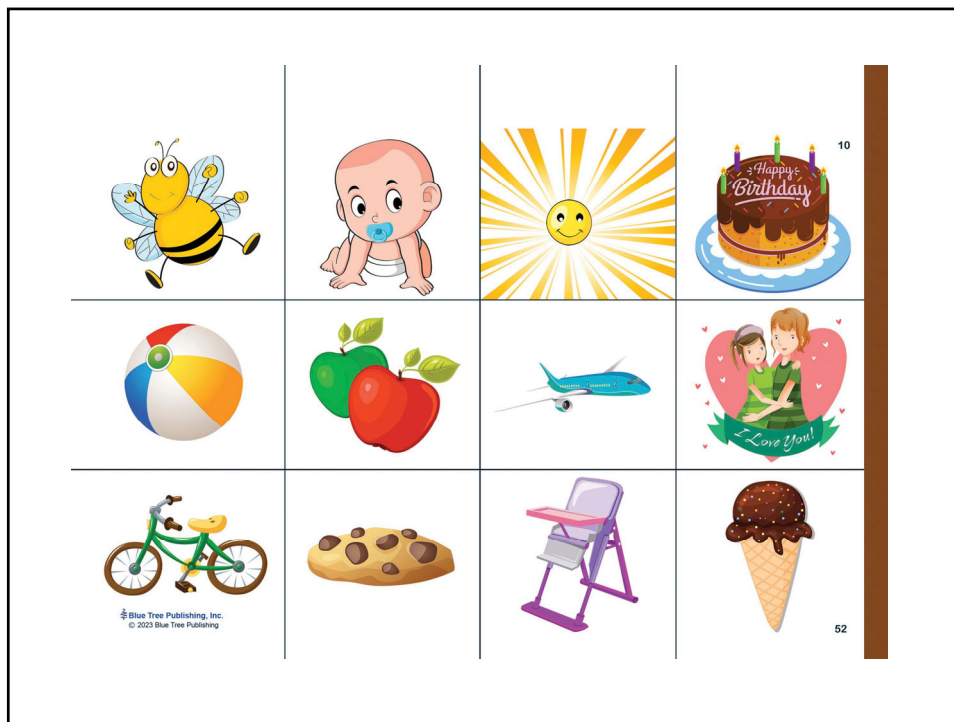
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Subtest 10

**Pattern Perception**

**1-Syllable / Trochees / Spondees / 3-Syllable Words**

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Subtest 11

**Spondees Recognition**

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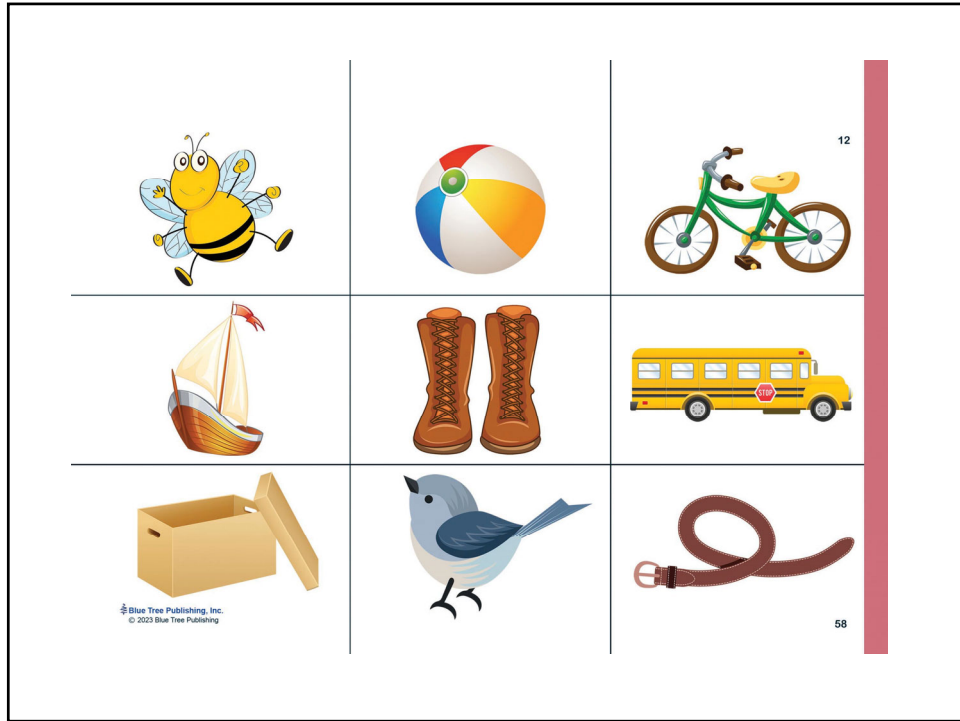


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Subtest 12

**1-Syllable Word Recognition**

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Subtest 13

**One Critical Element:  
Word Recognition**

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Subtest 14

**Two Critical Elements:**  
**Phrase Recognition**

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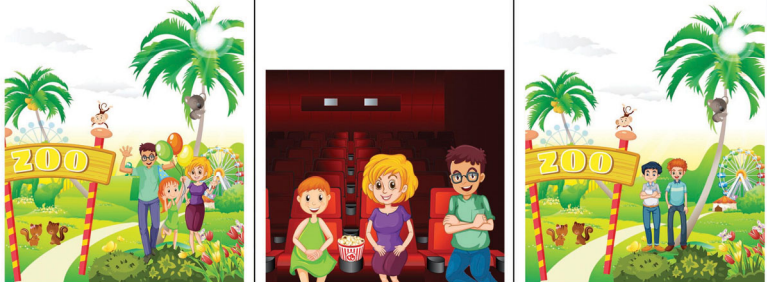


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Subtest 15

**Sequencing Three Events**  
**(Quiet)**

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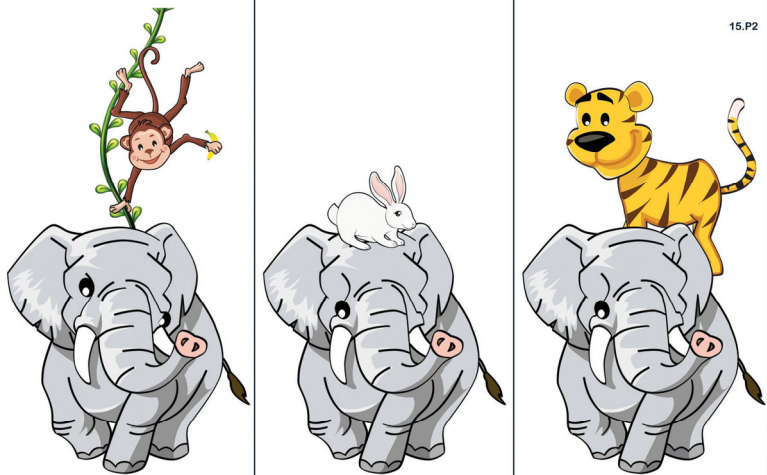
15.P1

**WHAT HAPPENED FIRST?**

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15.P2


**WHAT HAPPENED NEXT? / WHAT HAPPENED SECOND?**

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15.P3

**WHAT HAPPENED LAST?**

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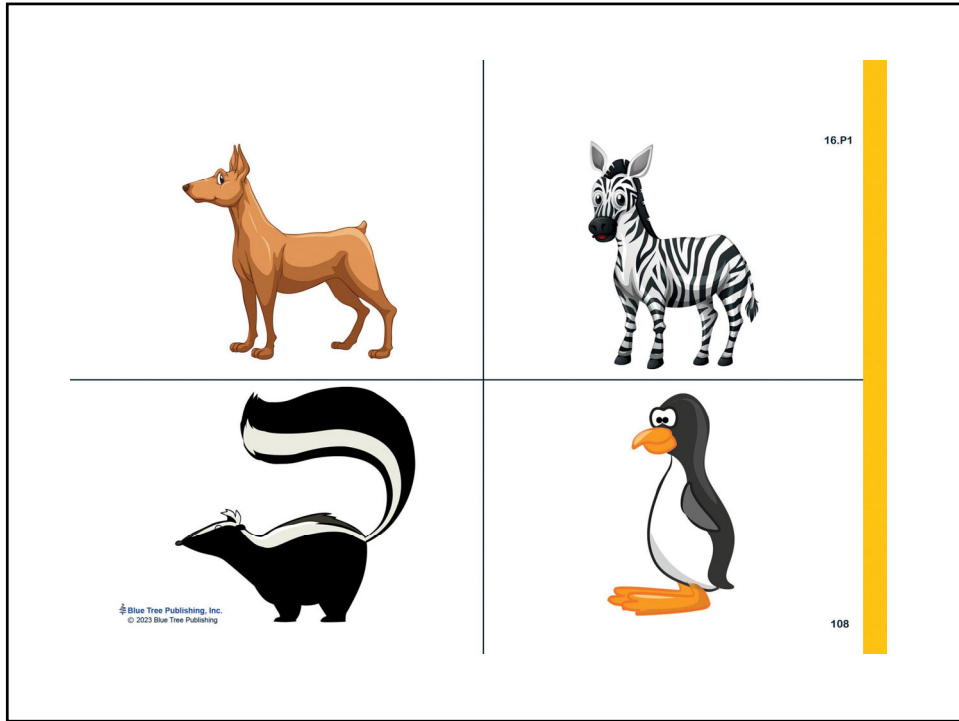
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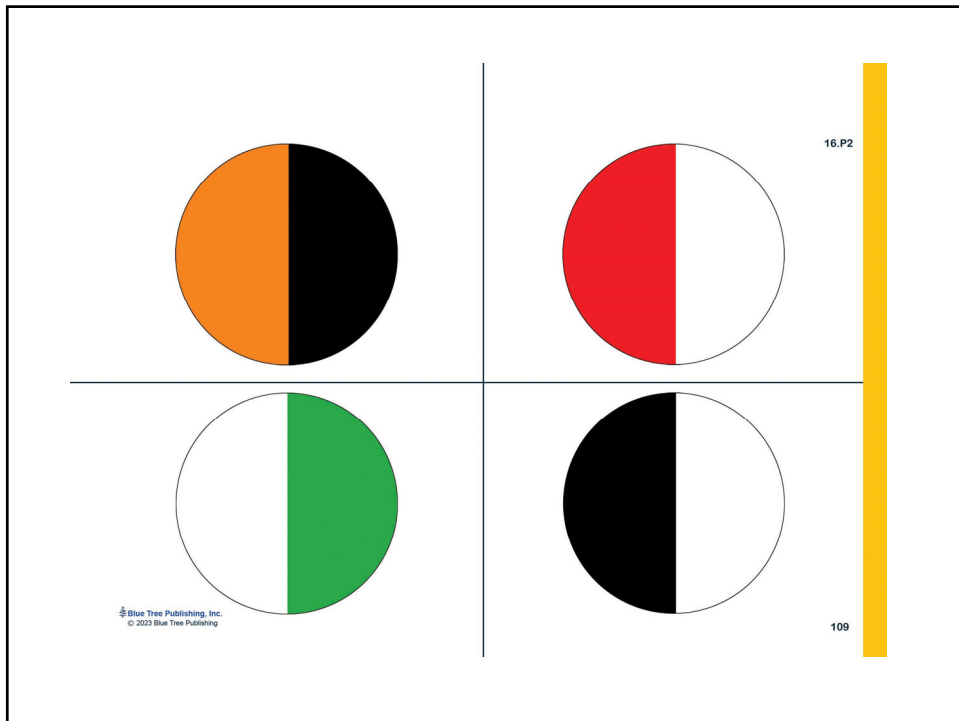
Subtest 16

**Listening Comprehension**  
**(Quiet)**

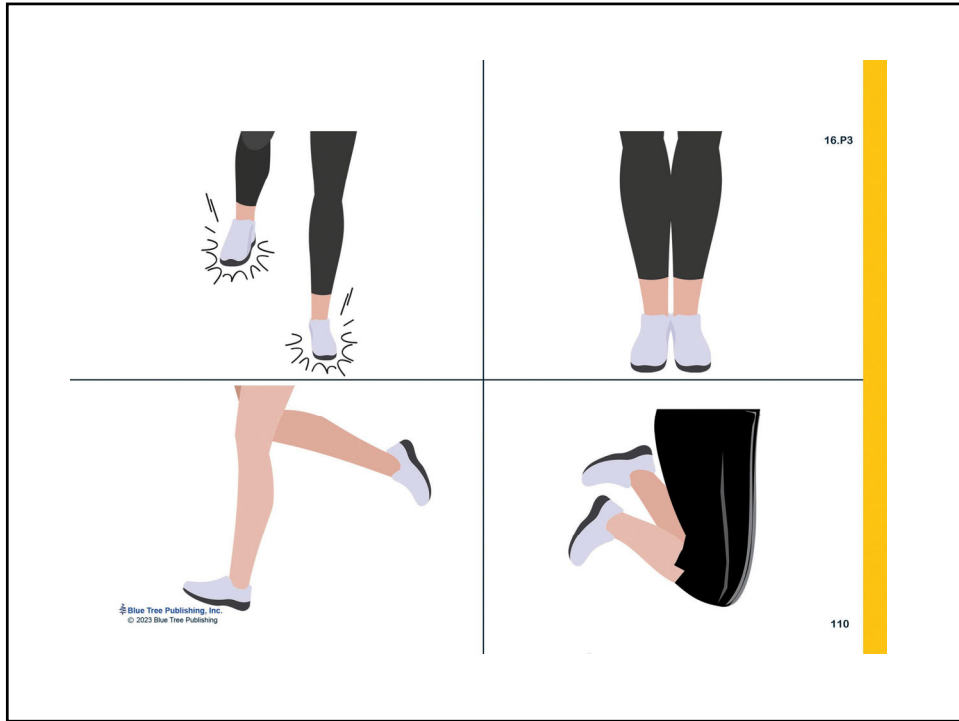
72



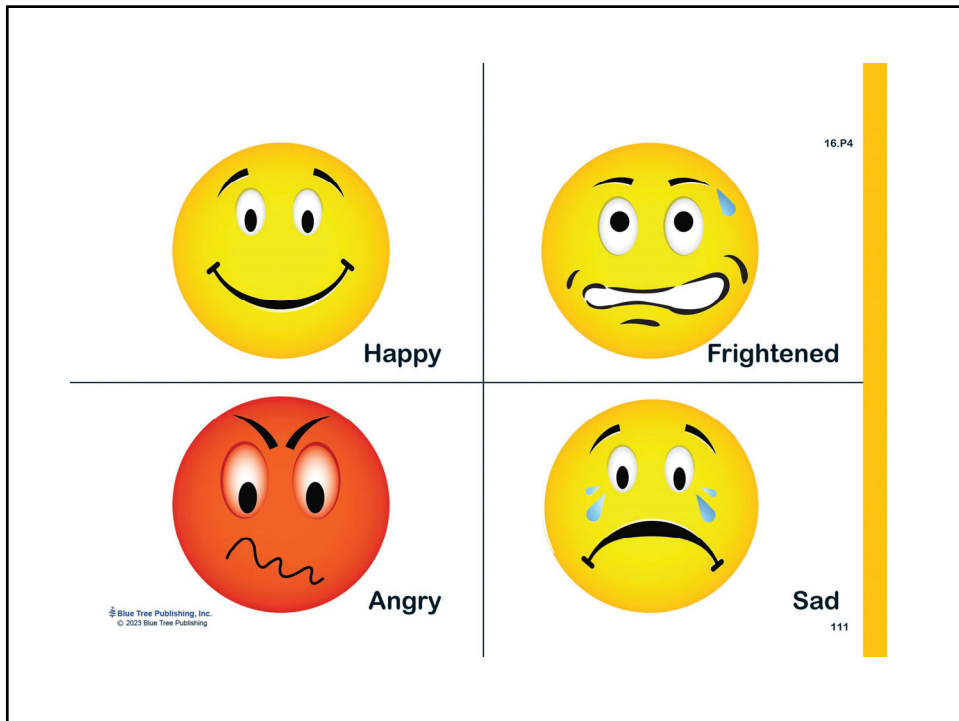
73



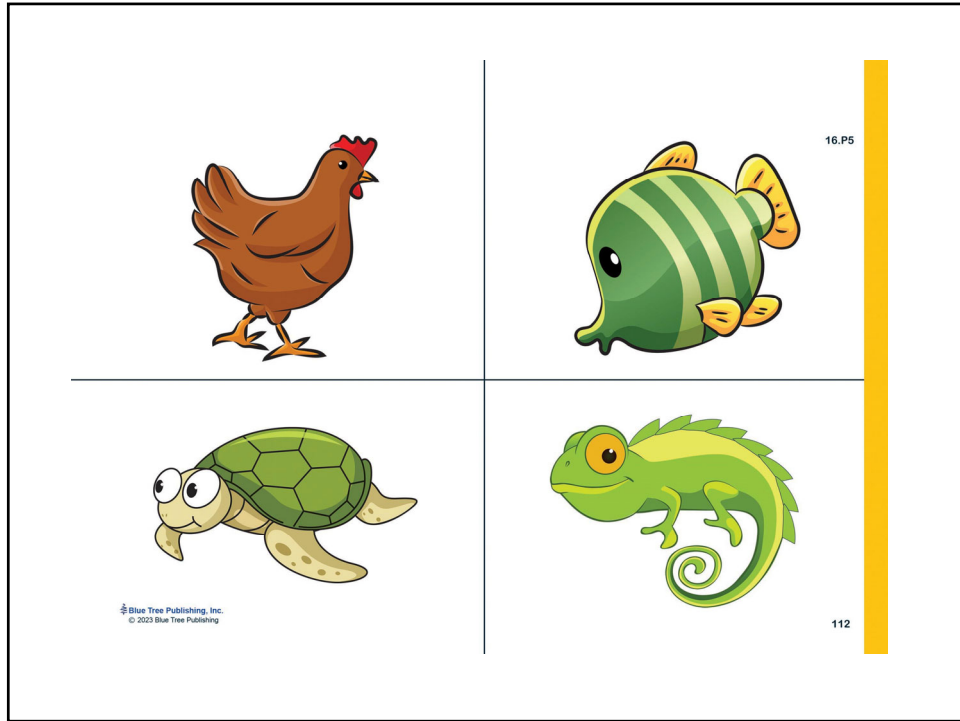
74



75



76



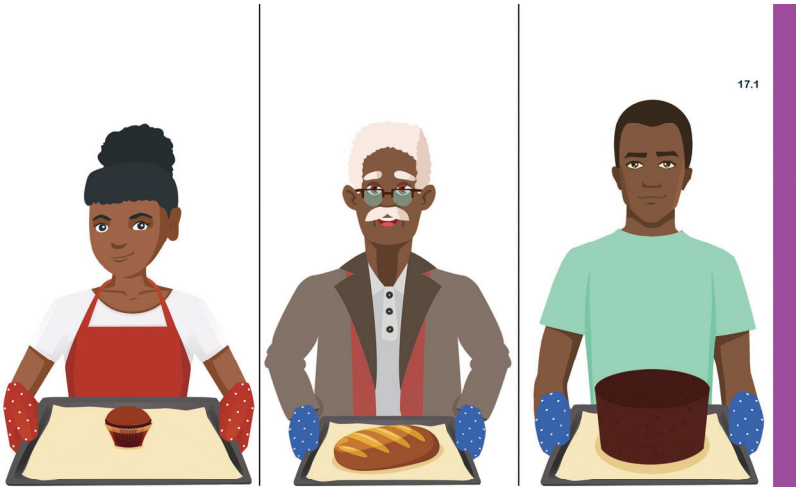
77

Subtest 17

**Sequencing Three Events**

**(+10 SNR)**

78



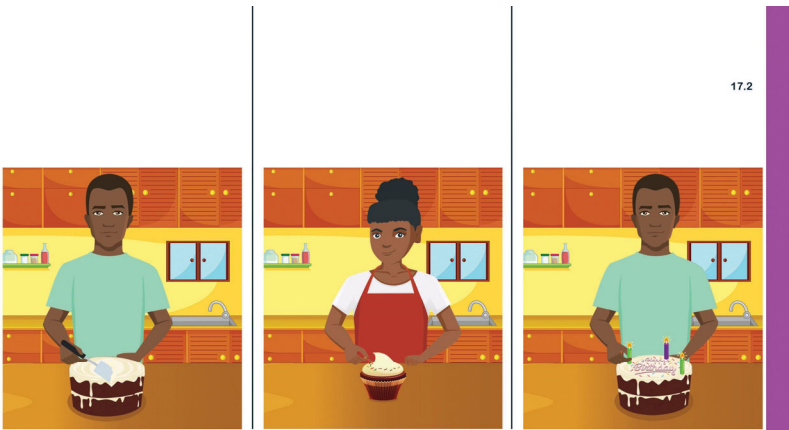
17.1

**WHAT HAPPENED FIRST?**

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79



17.2

**WHAT HAPPENED NEXT? / WHAT HAPPENED SECOND?**

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80



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WHAT HAPPENED LAST?

17.3

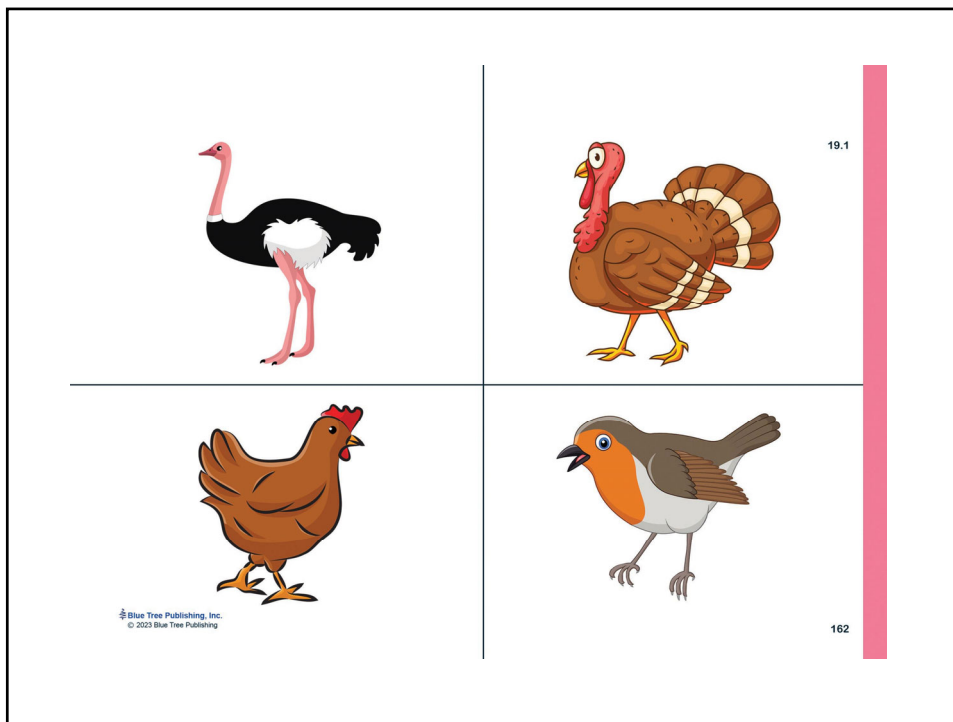
136

81

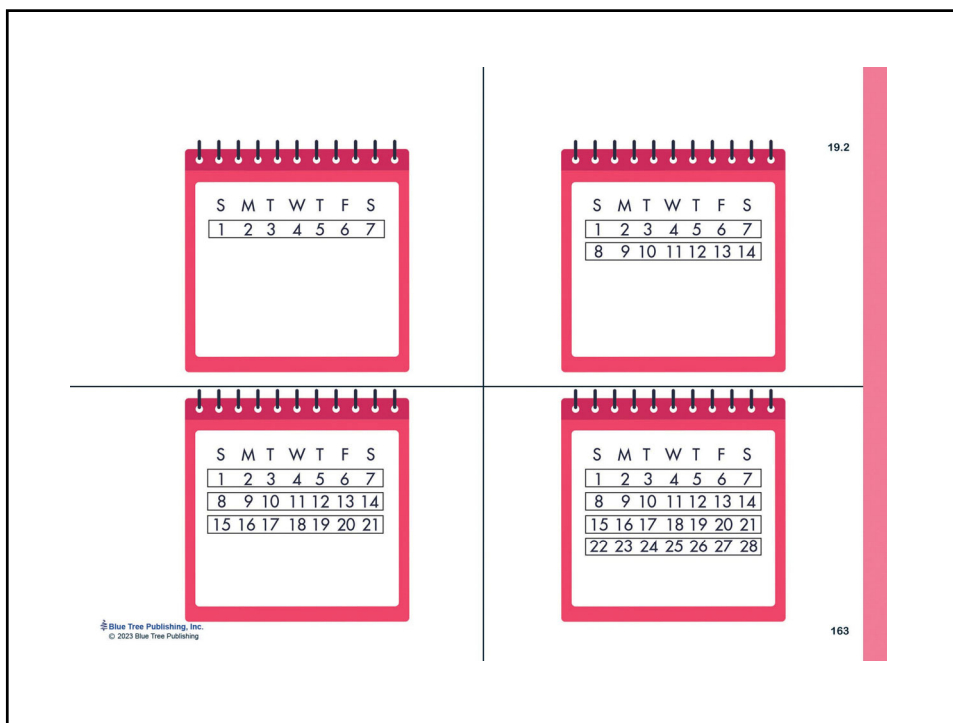
Subtest 18

**Listening Comprehension**  
**(+5 SNR)**

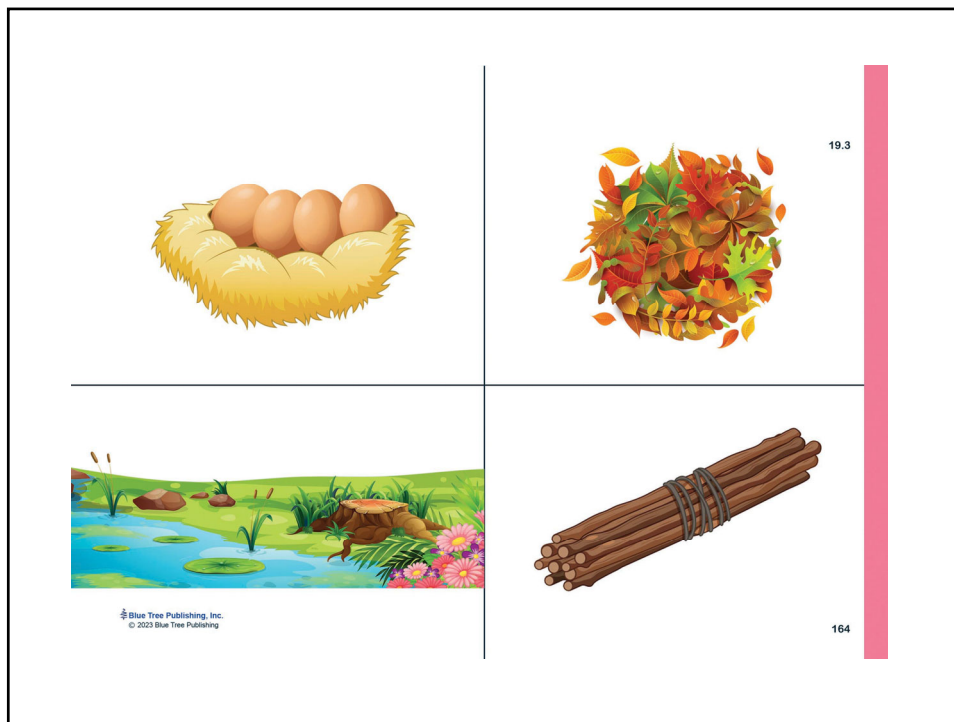
82



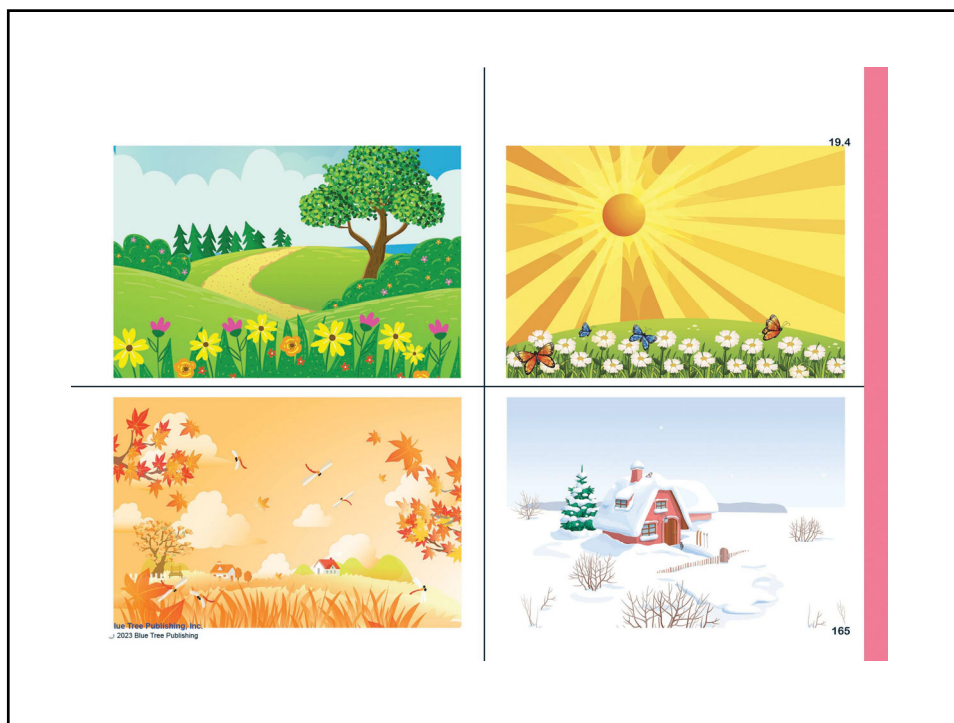
83



84

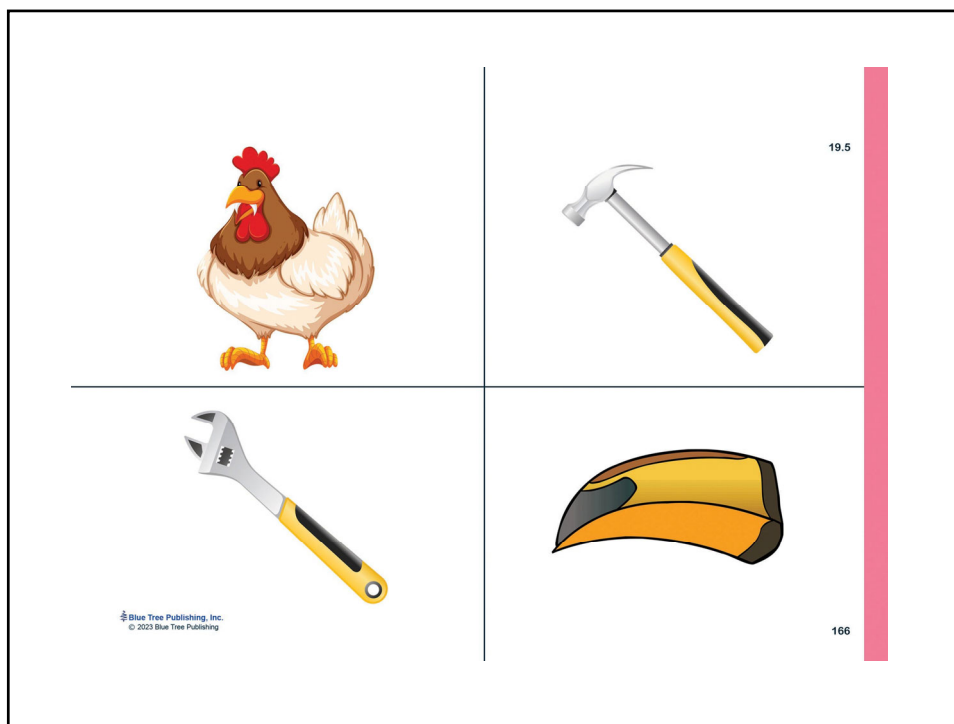


85

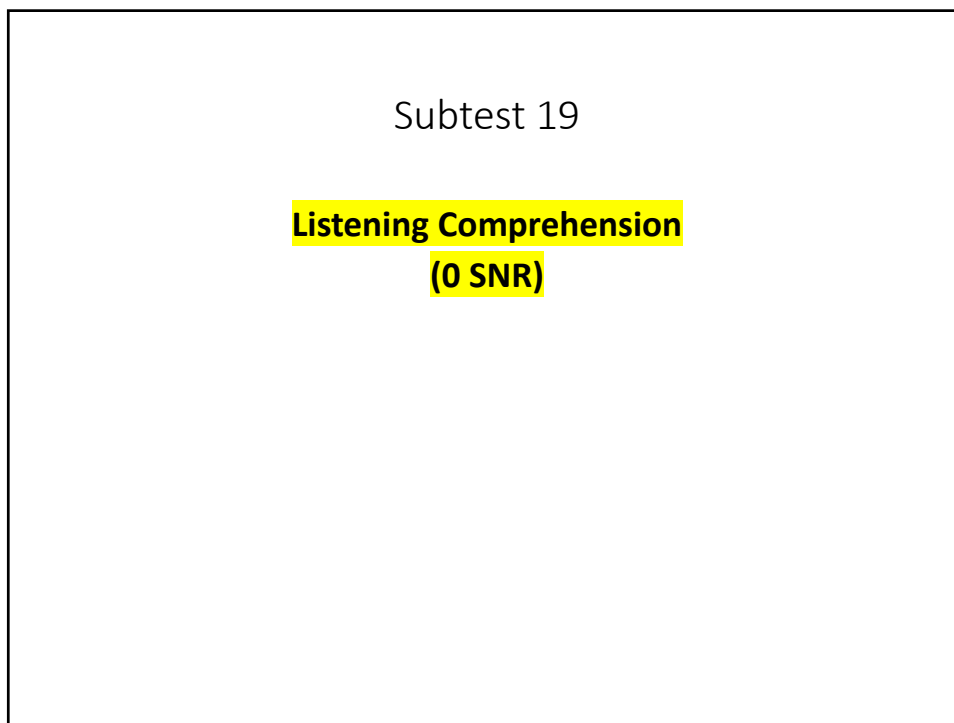


86

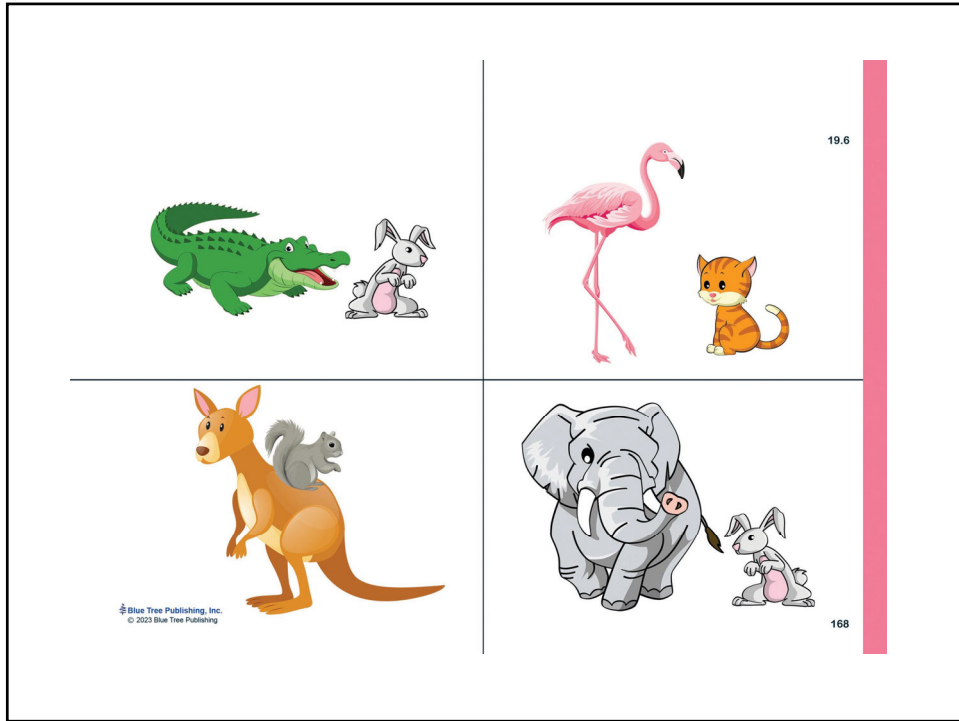




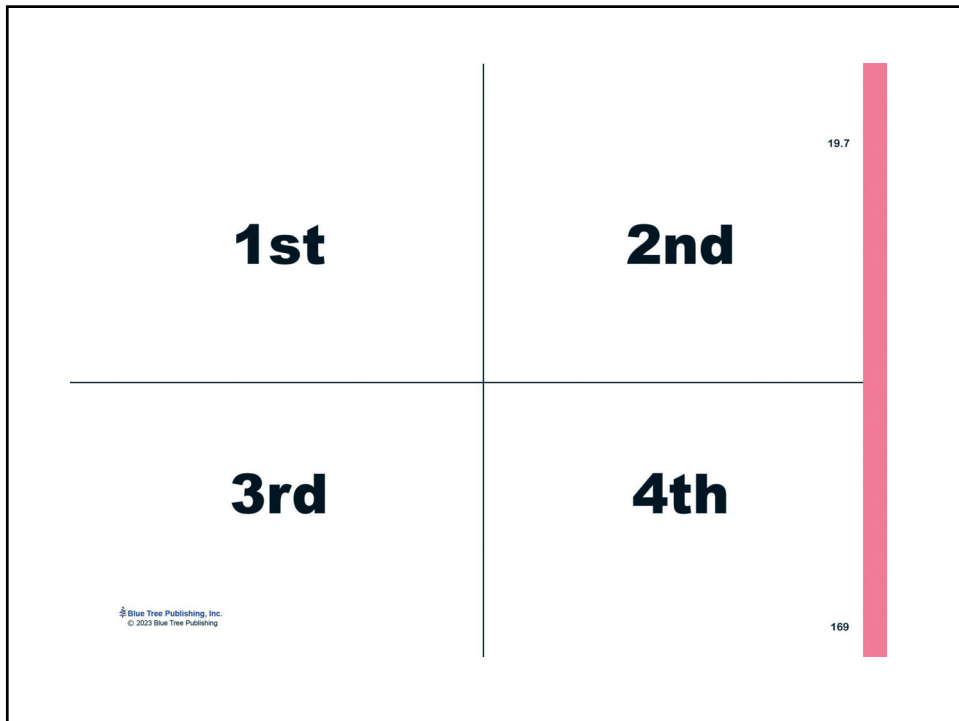
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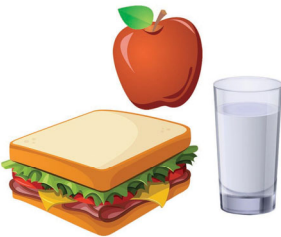

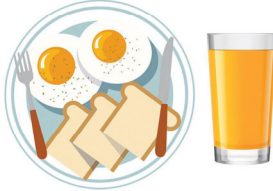
88







89



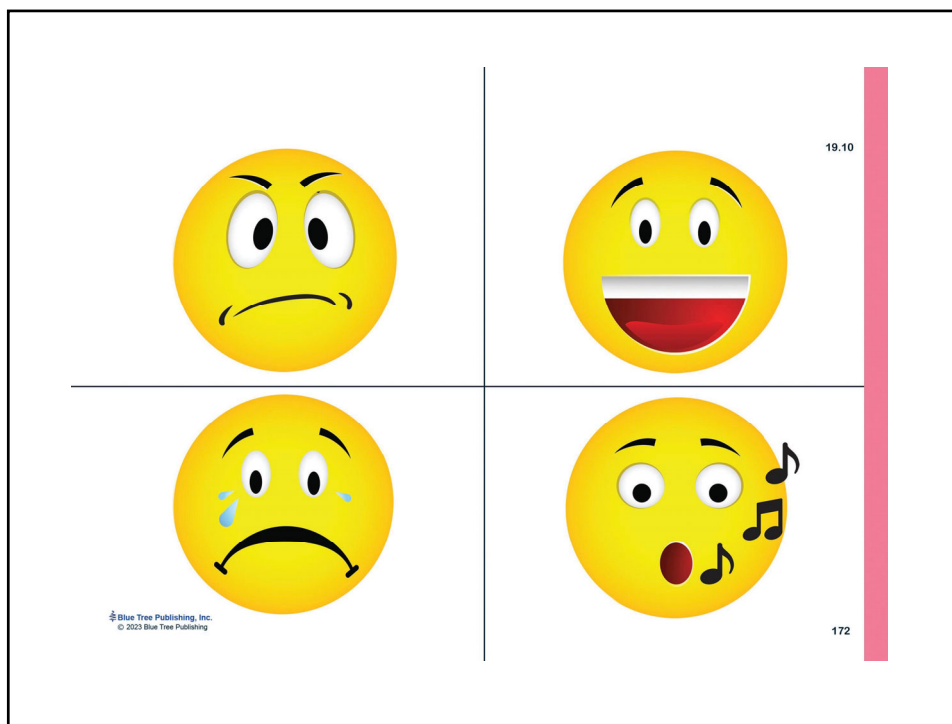
90

	 <p>19.8</p>
 <p>Blue Tree Publishing, Inc. © 2023 Blue Tree Publishing</p>	 <p>170</p>

91

 <p>Happy</p>	 <p>Nervous</p> <p>19.9</p>
 <p>Frightened</p> <p>Blue Tree Publishing, Inc. © 2023 Blue Tree Publishing</p>	 <p>Sick</p> <p>171</p>

92



93

### TAF's USB Drive

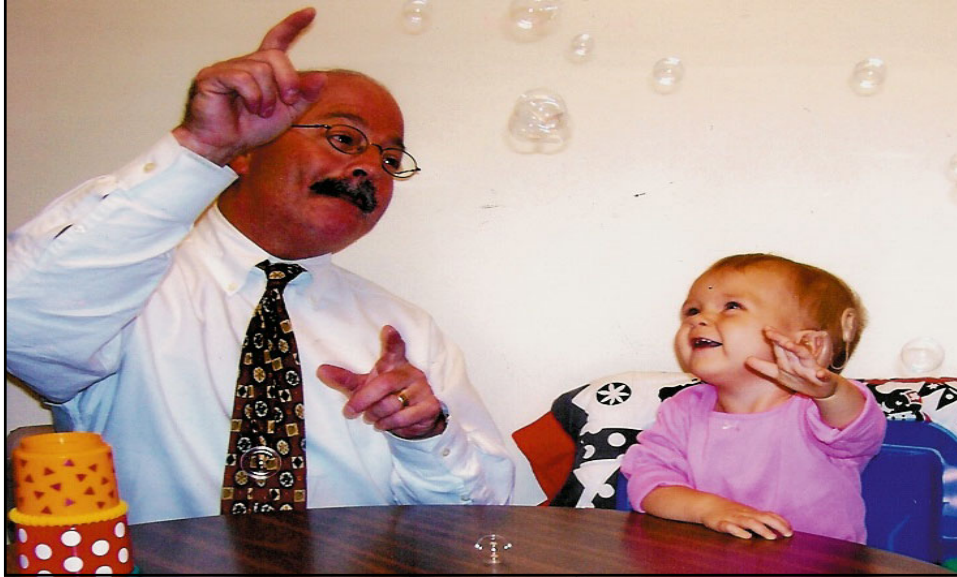
*Comes with the following:*

- Administration Manual
  - Audio Files (calibration tone & 19 Subtests)
  - Score Sheet (downloadable)
  - Score Summary Data (downloadable)
  - Coming! YouTube samples of calibration and all 19 Subtests (Ella!)
- &
- Upcoming: Treatment "Guide"



94

The Sky Is *Truly* The Limit!



95