

# **TEST OF AUDITORY FUNCTIONING**

Donald M . Goldberg

## **Manual**

August 2024

### **Introduction**

The *Test of Auditory Functioning (TAF)* was developed by Donald M. Goldberg, Ph.D., CCC-SLP/A, LSLS Cert. AVT, following his career as a University and College Professor (University of Montana, University of Connecticut, and the College of Wooster); Volunteer, Extern, Director of Audiology, and Executive Director of the Helen Beebe Speech and Hearing Center (Easton, PA); school-based Speech-Language Pathologist (Manatee County, FL); Co-Director of the Cleveland Clinic Foundation's Hearing Implant Program; and over 40 years as an Auditory-Verbal and Auditory-Based Therapist.

The TAF has been modeled, in part, by the *Test of Auditory Comprehension (TAC)* (Foreworks, 1979) and developed as a criterion-based assessment tool for annual administration to children who are deaf or hard of hearing. The TAF includes 19 subtests (see Appendix A, page 15), scaling the auditory “hierarchy” and landmark work of Norman Erber (1982). The current measure reflects “levels of auditory functioning” from discrimination of long versus short stimuli *through* listening comprehension with competing messages (at 0 signal-to-noise ratio/SNR). Designed for youngsters as young as approximately two years of age and older, the TAF was extensively field tested and indicated the test's appropriateness for some toddlers through approximately early adolescents. In addition, specific subtests have also been included to specifically evaluate the listening skills and abilities of adults with hearing loss (Subtest 1B and Subtest 6B). The field testing was completed on children using hearing aids, cochlear implants, auditory osseointegrated systems (“bone-anchored” systems), and bimodal fittings (one Hearing Aid and one Cochlear Implant).

## **Dedication**

The TAF is dedicated to three special groups of individuals:

My ***Mentors***, including my parents, the late Emilie and Irving Goldberg and “Beebe”[the late Helen Hulick Beebe]

My ***Family*** -- Sharon A. Sandridge, Ph.D., Nicholas, Adrienne, Sarah, Lydia, & Elizabeth Poelking (and our very special puppy dog – Maisley!)

“My ***Kiddos*** with hearing “*differences*” who have been my professional and clinical inspiration, as well as the joyous focus of my life’s work.

## **Acknowledgements**

Many thanks and sincere appreciation are offered to many, notably to the following:  
*The College of Wooster*

The College’s tremendous support of my clinical research cannot be overstated. The College made available Sophomore Research Assistants; and the institution’s most generous leave program supported my Research Leave to the Royal Institute for Deaf and Blind Children/University of Newcastle (North Rocks, Australia) in 2015, and my Research Leave in the Fall of 2019. And funding from the College from the Henry Luce Foundation, allowed for the field testing of the TAF with approximately 125 children on four continents during my Research Study Leave in the Fall of 2019 and my Spring Break in 2020 (as the pandemic rolled onward).

*William Roth* at the Cleveland Clinic recording studio, for his incredible work creating the 100s of audio files during the initial development of the TAF.

The Administrators, teachers, clinicians, and most importantly the children at the following programs:

- *Sunshine Cottage School for Deaf Children* in San Antonio, Texas
- *Auditory-Verbal Israel* (Jerusalem)
- *Auditory-Verbal UK* (London)
- *Auditory-Verbal Center* (Atlanta, Georgia)
- *The Shepherd Centre* (Sydney, Australia)

Special thanks to my daughter-in-law, *Adrienne Poelking*, for her recording contributions for Subtest 3 and Subtest 4 AND to my oldest granddaughter, *Sarah Poelking*, for her recording contributions for Subtest 4 and her creative writing talents for Story #2 of the final subtest -- Subtest 19.

*Karen Anderson, Ph.D.*, for her early encouragement to me to pursue this project, her sharing some *Test of Auditory Comprehension* history, and kind support.

And finally. -- to my friend and Publisher, *Robert O’Brien and his incredible team*, most notably the TAF’s most talented illustrator -- *Karen Cai*.

## **A Word About Terms**

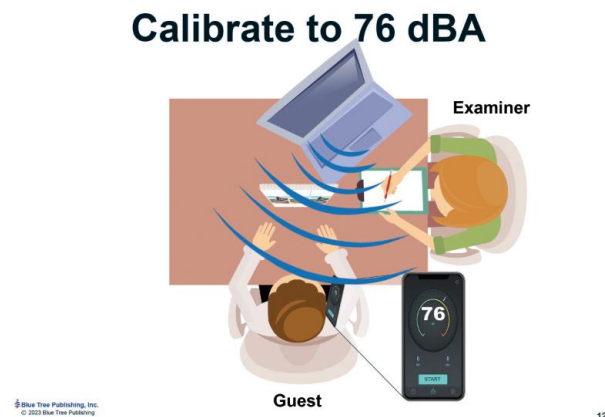
NOTE: Individuals being tested with the TAF are referred to as “Guests” versus having to wrestle with the semantics of patients, clients, students, among other terms. AND the “Examiner” will refer to the Speech-Language Pathologists, Audiologists, Teachers of the Deaf, members of Cochlear Implant Teams, and other qualified professionals administering the TAF.

## **TAF Administration**

### **Test Positioning and Calibration**

**Before administering the initial subtest to begin testing with the TAF, the volume of the Examiner’s computer MUST be established.**

See TAF Easel page 12 for the recommended positioning of the Examiner (illustrated in the Figure with clipboard) and the Guest. A computer should be positioned for ease of playing each audio clip needed for administration of each of the subtests (see testing positioning and calibration recommendation -- Figure 1).  
Figure 1



Using a Sound Level Meter (SLM) on the dBA scale, positioned at the approximate position of the Guest’s head (prior to his/her/their seating), adjust the computer’s speaker/s to a volume setting that registers 76 dBA.

An alternative to the use of a Sound Level Meter, is to download a free calibration APP (for example, NIOSH), that serves the task of a SLM, and similarly adjust the computer’s volume setting to register 76 dBA.

- \* Calibration must be completed before the arrival of the Guest to be tested.**
- \* Regardless of which Subtest the Examiner administers first – Calibration must be completed.**
- \* Following Calibration, check Yes on the cover page of the SCORE SHEET.**

It is recommended that the TAF be administered on an annual basis AND in order to make use of TAF as reliable and valid criterion-referenced tool, each test administration MUST verify that the volume of the audio clips is consistently presented at 76 dBA.

## **Where to Begin Testing -- Which Subtest?**

Depending on the Guest's auditory abilities, the Examiner may begin testing at any subtest. Youngest Guests should begin at Subtest (ST) 1. Based on the knowledge of the Examiner at what level the Guest is functioning – the entry level Subtest will vary for each Guest being tested with the TAF.

### **Some entry-level Subtest *suggestions/recommendations*:**

- Guests with limited auditory skills and abilities will typically need to begin with Subtest 1/Duration Discrimination
- If the Guest is familiar with and able to point to the sounds of the Ling Six Sound Test, Subtest 6 may be the initial subtest.
- For those Guests with familiarity with the Learning to Listen Associated Sounds for Animals and Vehicles and who are able to point to the animal and vehicle images of the respective associated sound --Subtest 7 and Subtest 8 might be the appropriate test entry choices.
- For those Guests with Pattern Perception-level skills, Subtests 9 through 12 are likely starting points.
- For Guests with word recognition abilities (can point to a named item), Subtest 13/One Critical Element should be considered for the testing starting point.
- For Guests with 3-part sequencing skills, Subtest 15/Sequencing Three Events is the recommended starting point.
- For Guest with early listening comprehension skills, Subtest 16/Listening Comprehension (Quiet) is the recommended starting point for obtaining baseline data.
- Finally, for those Guests who can be evaluated for their listening skills in the presence of competing messages ("Noise"), Subtest 17 through Subtest 19 have been developed to determine auditory functioning at +10 signal-noise-ratio (SNR) (for a sequencing task); +5 SNR (with a listening comprehension task); and the TAF concludes with testing at 0 SNR for another listening comprehension task.

**CAUTION:** For many Guests, before immediately starting with a subtest in noise, the final subtest in quiet, Subtest 16/Listening Comprehension (Quiet) is often the best starting point, followed by subsequent subtests in Noise.

## **Ceiling Recommendations**

Examiner judgment is recommended to be used in determining the “stopping point” or “ceiling,” when administering the TAF. For Subtest 1 through Subtest 12, the accuracy of a Guest’s performance should be the guide. In general, provided a Guest has responded correctly to approximately 70% of a subtest items, continuation to the next subtest is recommended. Two consecutive subtests that result in “challenges” for the Guest is a good guide that one has reached the subtest that is the appropriate “ceiling” subtest. One can always begin the next subtest and quickly determine if the subtest is or is not appropriate to continue administering to the Guest.

For Subtests 13 through 19, the TAF SCORE SHEET, specifically lists the PASS criterion for each subtest. Again, the Examiner is advised to make use of the guidelines of the number of correct responses in order to approximate a score of 70% (PASS criteria range from 66.7 to 73.3%) for each subtest, to help in determining if the Examiner should continue to the next subtest. Again, with two consecutive subtests that result in difficulty for the Guest, the recommended guide is that the Guest has reached test “ceiling.”

**NOTE:** Examiner judgment should of course be used if it is the Examiner’s clinical impression that once the Guest has FAILED his/her/their first Subtest, that the stopping point has been reached.

| <b><u>Subtest</u></b>                | <b><u>PASS Criteria</u></b> |
|--------------------------------------|-----------------------------|
| 13/One Critical Element              | 7/10 correct                |
| 14/Two Critical Elements             | 7/10 correct                |
| 15/Sequencing Three Events (Quiet)   | 6/9 correct                 |
| 16/Listening Comprehension (Quiet).  | 11/15 correct               |
| 17/Sequencing Three Events (+10 SNR) | 6/9 correct                 |
| 18/Listening Comprehension (+5 SNR). | 7/10 correct                |
| 19/Listening Comprehension (0 SNR)   | 7/10 correct                |

## Index for Subtest Navigation

Easel page 4 provides a listing of Subtests 1 through 14 (see Figure 2) and their respective page numbers and Easel page 5 provides the listing for Subtests 15 through 19. The Examiner is instructed to **Turn Easel to Side 2** on page 86.

Figure 2

| Index<br>Side 1                                                  |       |                                                                          | Index<br>Side 2 |                                                        |         |
|------------------------------------------------------------------|-------|--------------------------------------------------------------------------|-----------------|--------------------------------------------------------|---------|
| 1A Duration Discrimination<br>Pediatric                          | 13-17 | 7 Learning to Listen: Animals                                            | 41-43           | 15 Sequencing Three Events (Quiet)                     | 87-104  |
| 1B Duration Discrimination<br>Adult                              | 18-20 | 8 Learning to Listen: Vehicles                                           | 44-46           | 16 Listening Comprehension (Quiet)                     | 105-130 |
| 2 Pitch Discrimination                                           | 21-23 | 9 Pattern Perception (1- vs. 3-syllable words)                           | 47-49           | 17 Sequencing Three Events (+10 Signal-to-Noise Ratio) | 131-144 |
| 3 Male vs. Female<br>Fundamental Frequency Discrimination        | 24-26 | 10 Pattern Perception (1-syllable/Trochees/<br>Spondee/3-syllable words) | 50-52           | 18 Listening Comprehension (+3 SNR)                    | 145-158 |
| 4 Male vs. Female vs. Child<br>Fundamental Frequency Recognition | 27-29 | 11 Spondee Recognition                                                   | 53-55           | 19 Listening Comprehension (9 SNR)                     | 159-172 |
| 5 Environmental/Familiar Sounds Recognition                      | 30-32 | 12 1-Syllable Word Recognition                                           | 56-58           |                                                        |         |
| 6A Ling Six Sounds/Frequency Recognition<br>Pediatric            | 33-37 | 13 One Critical Element/Word Recognition                                 | 59-73           |                                                        |         |
| 6B Ling Six Sounds/Frequency Recognition<br>Adult                | 38-40 | 14 Two Critical Elements/Phrase Recognition                              | 74-85           |                                                        |         |

To allow the Examiner ease of navigating to a specific subtest, color-coding has been provided on the right margin of all of the easel pages, to help find whichever subtest one wishes to administer.

ALSO note that each picture plate of the TAF is numbered in the upper right hand corner. The number recorded on each picture plate image is labeled to represent the Subtest number. And if appropriate, the Practice and/or Item number are printed in the upper right hand corner of the picture plate (see Figures 3 and 4).

Figure 3  
Subtest 13. Practice



Figure 4  
Subtest 14. Item 1



### Subtest Instructions

#### **Subtest 1A: Duration Discrimination (Long versus Short)**

##### **Pediatric**

Examiner should administer Subtest 1A (Easel pages 15-17) after reading the following instructions, available in the red-outlined box on Easel page 16:  
*When you hear a long "vroom" sound – point to the race car AND when you hear a "hop hop hop" sound – point to the bunny rabbit.*

There are 10 subtest Test Items.

#### **Subtest 1B: Duration Discrimination (Long versus Short)**

##### **Adult**

Examiner should administer Subtest 1B (Easel pages 18-20) after reading the following instructions, available in the red-outlined box on Easel page 19:  
*When you hear a long "ahhh" sound – point to the long line AND when you hear "ah ah ah" sound – point to the three dots."*

There are 10 subtest Test Items.

#### **Subtest 2: Pitch Discrimination (High versus Low)**

Examiner should administer Subtest 2 (Easel pages 21-23) after reading the following instructions, available in the red-outlined box on Easel page 22:  
*When you hear a low pitch (low or deep) drum sound – point to the drum AND when you hear a high pitch whistle sound – point to the whistle.*

There are 10 subtest Test Items.

### **Subtest 3: Male versus Female / Fundamental Frequency Discrimination**

Examiner should administer Subtest 3 (Easel pages 24-26) after reading the following instructions available in the red-outlined box on Easel page 25:  
*When you hear a Lady or Woman (Female/Mommy) say "Hello, my name is Reagan" [rae gin] – point to the Lady/Woman AND when you hear a Man (Male/Daddy) say "Hello, my name is Reagan" – point to the Man.*

There are 10 subtest Test Items.

### **Subtest 4: Male versus Female versus Child / Fundamental Frequency Recognition**

Examiner should administer Subtest 4 (Easel pages 27-29) after reading the following instructions available in the red-outlined box on Easel page 28:  
*When you hear a Lady or Woman (Female/Mommy) say "Hello, my name is Reagan" [rae gin] – point to the Lady/Woman; when you hear a Man (Male/Daddy) say "Hello, my name is Reagan" point to the Man; when you hear a Child (Girl/Kid) say, "Hello, my name is Reagan" – point to the Child.*

There are 10 subtest Test Items.

### **Subtest 5: Environmental/Familiar Sounds Recognition**

Examiner should administer Subtest 5 (Easel pages 30-32) after reading the following instructions available in the red-outlined box on Easel page 31:  
*You will be hearing several familiar sounds. For each sound – point to the picture you hear. The sounds you will hear include: an alarm clock ring, a cell phone call, a microwave beep, a bike horn squeak, water rushing, a vacuum, a toilet flushing, a motorcycle, and a dog barking.*

There are 9 subtest Test Items.

### **Subtest 6A: Ling Six Sounds (Frequency Recognition)** **Pediatric**

Examiner should administer Subtest 6A (Easel pages 35-37) after reading the following instructions available in the red-outlined box on Easel page 36:  
*You will hear 6 sounds. For each sound – point to the sound you hear. The sounds will be "oo" for the train, "mm" for the ice cream cone, "ah" for the airplane, "ee" for the mouse, "sh" for the baby sleeping, and "sss" for the snake.*

There are 15 subtest Test Items.

### **Subtest 6B: Ling Six Sounds (Frequency Recognition)** **Adult**

Examiner should administer Subtest 6B (Easel pages 38-40) after reading the following instructions available in the red-outlined box on Easel page 39:  
*You will hear 6 sounds. For each sound – point to the sound you hear. The sounds will be "oo," "mmm," "ah," "ee," "sh," and "sss."*

There are 15 subtest Test Items.

### **Subtest 7: Learning to Listen Associated Sounds (Animals)**

Examiner should administer Subtest 7 (Easel pages 41-43) after reading the following instructions available in the red-outlined box on Easel page 42:

*You will be hearing animal sounds – point to the animal you hear.*

*NOTE: As needed, the Examiner may first orient the Guest to the following “Learning to Listen”(LTL) Associated Sounds – pointing out each animal name and their respective LTL associated sound, as one points to each animal on page 43, as follows:*

*Duck – quack quack quack*

*Cow -- moo*

*Horse -- neigh*

*Cat -- meow*

*Sheep – baaa baaa*

*Chicken – baww baww baww*

There are 10 subtest Test Items.

### **Subtest 8: Learning to Listen Associated Sounds (Vehicles)**

Examiner should administer Subtest 8 (Easel pages 44-46) after reading the following instructions available in the red-outlined box on Easel page 45:

*You will be hearing vehicle sounds – point to the vehicle you hear.*

*NOTE: As needed, the Examiner may first orient the Guest to the following “Learning to Listen”(LTL) Associated Sounds –pointing out each vehicle name and their respective LTL associated sound, as one points to each vehicle on page 46, as follows:*

*Helicopter – “raspberries” sound*

*Boat – puh puh puh*

*Truck – beep beep beep*

*Train – chooo chooo*

*Airplane – ahhh ahhh*

*Fire Truck – whee oo whee oo*

There are 10 subtest Test Items.

### **Subtest 9: Pattern Perception (1-syllable versus 3-syllable words)**

Examiner should administer Subtest 9 (Easel pages 47-49) after reading the following instructions available in the red-outlined box on Easel page 48:

*You will be hearing one-syllable words and three-syllable words – point to the picture of the word or words you hear.*

*NOTE: As needed, the Examiner may first orient the Guest to the 6 images illustrated on the picture plate (page 49: bee, ball, bike, birthday cake, ice cream cone, I love you.)*

*NOTE: The carrier phrase, “Show Me \_\_\_\_\_, will be used for each Test Item.*

There are 10 subtest Test Items.

**Subtest 10: Pattern Perception (1-syllable words/Trochees/Spondees/  
3-syllable words)**

Examiner should administer Subtest 10 (Easel pages 50-52) after reading the following instructions available in the red-outlined box on Easel page 51:

*When you hear the word or words – point to the picture of the word or words you hear.*

*NOTE: As needed, the Examiner may first orient the Guest to the 12 images illustrated on the picture plate (page 52: bee, ball, bike, baby, apple, cookie, sunshine, airplane, high chair; birthday cake, I love you, ice cream cone.)*

*NOTE: The carrier phrase, “Show Me \_\_\_\_\_, will be used for each Test Item.*

There are 15 subtest Test Items.

**Subtest 11: Spondee Word Recognition**

Examiner should administer Subtest 11 (Easel pages 53-55) after reading the following instructions available in the red outlined box on Easel page 54:

*You will be hearing a word – point to the picture of the word you hear.*

*NOTE: As needed, the Examiner may first orient the Guest to the 9 images illustrated on the picture plate (page 55: sunshine, ice cream, high chair, bathtub, rainbow, toothbrush, cupcake, baseball, mushroom.)*

*NOTE: No carrier phrase is used for Test Item on this Subtest.*

There are 9 subtest Test Items.

**Subtest 12: Word Recognition (1-syllable /Bb/Words)**

Examiner should administer Subtest 12 (Easel pages 56-58) after reading the following instructions available in the red outlined box on Easel page 57:

*You will be a hearing a word – point to the picture of the word you hear.*

*NOTE: As needed, the Examiner may first orient the Guest to the 9 images: illustrated on the picture plate (page 58: bee, ball, bike, boat, boot, bus, box, bird, belt.)*

*NOTE: No carrier phrase is used for Test Item on this Subtest.*

There are 9 subtest Test Items.

**Subtest 13: Word Recognition: One Critical Element**

Examiner should administer Subtest 13 (Easel pages 59-73) after reading the following instructions available in the red outlined box on Easel page 60:

*You will be hearing a word – point to the picture of the word you hear*

*NOTE: The carrier phrase, “Show Me \_\_\_\_\_,” will be used for each Test Item.*

There is 1 **Practice** word and 10 subtest **Test Items**.

**Subtest 14: Phrase Recognition: Two Critical Elements**

Examiner should administer Subtest 14 (Easel pages 74-85) after reading the following instructions available in the red-outlined box on Easel page 75:

*You will be hearing 2 words – point to the picture of the 2 words you hear.*

*NOTE: The carrier phrase, “Show Me \_\_\_\_\_.” will be used for each Test Item.*

There are 10 subtest Test Items.

**TURN EASEL TO SIDE 2****Subtest 15: Sequencing Three Events (Quiet)**

Examiner should administer Subtest 15 (Easel pages 87-104) after reading the following instructions available in the red-outlined box on Easel page 88:

*You will hear 3 sentences [you should use your fingers to point out 1-2-3 as the sentences are presented]. Then you will be asked to point to the picture of What happened first, What happened next, and What happened last.*

There is 1 **Practice 3-Part Sequence** followed by 3 **Practice Test Sequence images**.

There are 9 subtest **Test Items**.

(Each of the 3 **Test Sequences** is followed by 3 Test Sequence images.)

Note: Play the audio file of the **Practice Sequence** and then flip to the next three easel pages and read the prompt on each picture plate (What happened first?); flip page (What happened next?); flip the page (What happened last?).

Proceed to the audio file for **Test Sequence #1**, followed by the three questions. Repeat for **Test Sequence #2**; and finally Repeat for **Test Sequence #3**.

**Subtest 16: Listening Comprehension: Details (Quiet)**

Examiner should administer Subtest 16 (Easel pages 105-130) after reading the following instructions available in the red-outlined box on Easel page 106:

*You will hear a story. Following the story, point to the picture that answers the questions about the story.*

There is 1 **Practice Story** and 5 **Practice Detail images/questions**.

Then: There are 15 subtest **Test Items**.

(Each of the 3 **Test Stories** is followed by 5 **Test Story images**.)

**Subtest 17: Sequencing Three Events (+10 Signal-to-Noise Ratio/SNR)**

Examiner should administer Subtest 17 (Easel pages 131-144) after reading the following instructions available in the red-outlined box on Easel page 132:

*You will hear 3 sentences [you should use your fingers to point out 1-2-3 as the sentences are presented]. Then you will be asked to point to the picture of What happened first, What happened next, and What happened last. During the story you will be hearing noise in the background. Ignore the noise and focus on the 3 sentences you hear.*

There are 9 subtest Test Items [3-Test Sequences.]

Note: Play the audio file of each of the three Test Sequences and after each separate audio file, flip to the next three easel pages and read the prompt on each picture plate (What happened first?); flip page (What happened next?); flip the page (What happened last?).

**Subtest 18: Listening Comprehension: Details (+5 SNR)**

Examiner should administer Subtest 18 (Easel pages 145-158) after reading the following instructions available in the red-outlined box on Easel page 146:

*You will hear a story. Following the story, point to the picture that answers the questions about the story. During the story you will be hearing a little more noise in the background. Ignore the noise and focus on the story.*

There are 10 subtest Test Items [2 Test Stories.]

### **Subtest 19: Listening Comprehension: Details (0 SNR)**

Examiner should administer Subtest 19 (Easel pages 159-172) after reading the following instructions available in the red outlined box on Easel page 160:

*You will hear a story. Following the story, point to the picture that answers the questions about the story. During the story you will be hearing even more noise in the background. Ignore the noise and focus on the story.*

There are 10 subtest Test Items [2 Test Stories.]

### **SCORE SHEET**

The Score Sheet is available for downloading from the USB drive for each Guest to be administered the TAF.

**TAF SCRIPT** See Appendix B, Pages 16-22.

### **SUMMARY SCORE SHEET**

On page 10 of the downloadable Score Sheet, a Summary document has been developed. Provided whichever subtest was initially PASSEd, full credit should be awarded for ALL of the subtest/s items prior to the “starting” or “initial” subtest administered AND PASSEd.

### **REPORT WRITE-UP RECOMMENDATION**

A report write-up model/recommendation is provided, should the Examiner so choose. See Appendix C (page 23-25) for report write -up recommendation.

### **SOME FINAL ADDITIONAL HINTS/RECOMMENDATIONS**

Guest should be periodically reinforced for their participation and responses (both correct and incorrect). In order to protect the integrity of the TAF administration, with the exception of the Practice Items, **the accuracy of a Guest’s responses should NOT be provided.**

Unless the Guest is off task, the recorded **stimuli should not be repeated to provide additional opportunity to listen a second time to the prompt/s.**

It is recommended that the **audio files on the USB drive be downloaded to the Examiner’s computer’s hard drive** OR played by coupling the drive to a computer via a “dongle.”

YouTube videos have been completed to assist Examiners prior to one's first administration of the TAF (including Calibration instruction and samples of each of the 19 subtests).

### Subtests

- 1-8            <https://www.youtube.com/watch?v=DI7Yac3Aryg&t=23s>
- 9-12          [https://www.youtube.com/watch?v=wL8Rw\\_Y0xq4&t=67s](https://www.youtube.com/watch?v=wL8Rw_Y0xq4&t=67s)
- 13-19        <https://www.youtube.com/watch?v=TwfBTqWSmUc>
- Calibration <https://www.youtube.com/shorts/Nd4uF7R2rvk>

\*\*\*\*\*

Any difficulties with the recordings on the USB drive should be reported to the Publisher.

The author, Donald M. Goldberg, Ph.D., can be contacted as follows:  
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## **Appendix A**

TAF Subtests  
Page 15

## **Appendix B**

TAF Script  
Pages 16-22

## **Appendix C**

Summary Score Sheet & Report Write-Up Recommendation  
Pages 23-25

## **Appendix A**

### **TAF Subtests**

|             |                                                                    |
|-------------|--------------------------------------------------------------------|
| Subtest 1   | Duration Discrimination<br>1A Pediatric<br>1B Adult                |
| Subtest 2:  | Pitch Discrimination                                               |
| Subtest 3:  | Male vs. Female / Fundamental Frequency Discrimination             |
| Subtest 4:  | Male vs. Female vs. Child / Fundamental Frequency Recognition      |
| Subtest 5:  | Environmental / Familiar Sounds Recognition                        |
| Subtest 6   | Ling Six Sounds/Frequency Recognition<br>6A Pediatric<br>6B Adult  |
| Subtest 7:  | Learning to Listen Associated Sounds - Animals                     |
| Subtest 8:  | Learning to Listen Associated Sounds - Vehicles                    |
| Subtest 9:  | Pattern Perception (1- vs. 3-syllable words)                       |
| Subtest 10: | Pattern Perception (1-syll. / Trochees / Spondees / 3-syll. words) |
| Subtest 11: | Spondee Recognition                                                |
| Subtest 12: | 1-Syllable Word Recognition                                        |
| Subtest 13: | One Critical Element / Word Recognition                            |
| Subtest 14: | Two Critical Elements / Phrase Recognition                         |
| Subtest 15: | Sequencing Three Events (Quiet)                                    |
| Subtest 16: | Listening Comprehension (Quiet)                                    |
| Subtest 17: | Sequencing Three Events in Noise (+10 Signal-to-Noise Ratio / SNR) |
| Subtest 18: | Listening Comprehension in Noise (+5 SNR)                          |
| Subtest 19: | Listening Comprehension in Noise (0 SNR)                           |

## Appendix B

### TAF Script

#### SUBTEST

##### ST 1: Duration Discrimination

##### 1A: Pediatric

Vroom (Long) versus Hop Hop Hop (Short)

#### STIMULI

Vroom  
Hop hop hop  
Vroom  
Vroom  
Hop hop hop  
Hop hop hop  
Hop hop hop  
Vroom/  
Hop hop hop  
Vroom

(10)

##### 1B: Adult

Ahhh (Long) versus Ah Ah Ah (Short)

Ahhh  
Ah ah ah  
Ahhh  
Ah ah ah  
Ahhh  
Ahhh  
Ah ah ah  
Ahhh  
Ah ah ah  
Ah ah ah

(10)

##### ST 2: Pitch Discrimination

Drum (Low) versus Whistle (High)

Whistle  
Drum  
Whistle  
Drum  
Drum  
Whistle  
Drum  
Whistle  
Whistle  
Drum

(10)

**ST 3: Fundamental Frequency Discrimination** F M M F F M F M M M (10)

Male/M: "Hello, my name is Reagan"

Female/F: "Hello, my name is Reagan"

**ST 4: Fundamental Frequency Recognition** M C C F M C C F F M (10)

Male/M: "Hello, my name is Reagan"

Female/F: "Hello, my name is Reagan"

Child/C: "Hello, my name is Reagan"

**ST 5: Environmental/Familiar Sounds**

Bike Horn

Microwave Beep

Motorcycle

Vacuum Cleaner

Alarm Clock

Water Rushing

Dog Barking

Toilet Flushing

Cell Phone

(9)

**ST 6: Ling Six Sounds**

**6A: Pediatric// 6B: Adult**

/m/

/i/ ee

/sh/

/u/ oo

/m/

/s/

/a/ ah

/u/ oo

/sh/

/i/ ee

/sh/

/s/

/a/ ah

/i/ ee

/s/

(15)

**ST 7: Learning to Listen: Animals**

Quack quack quack for DUCK / Baww baww baww for CHICKEN / Mooo for COW /

Baaa baaa for SHEEP / Neigh for HORSE / Meow for CAT /

LISTEN:

Duck/Chicken/Cow/Sheep/Duck/

Horse/Cat/Sheep/Cow/ Cat (10)

**ST 8: Learning to Listen: Vehicles**

“Raspberries” for HELICOPTER / “Puh Puh Puh” for BOAT /  
“Beep Beep Beep” for DUMP TRUCK / “Chooo Chooo” for TRAIN /  
melodic “Ah” for AIRPLANE / “Whee Ooo Whee Ooo” for FIRE TRUCK

LISTEN: Train/Airplane/Dump Truck/  
Fire Truck/Boat/Helicopter/  
Fire Truck/Dump Truck/  
Airplane/Boat (10)

**ST 9: Pattern Perception (1-syllable versus 3-syllables)**

SHOW ME: Bee/Birthday Cake/  
Ice Cream Cone/Bike/Bee/  
Birthday Cake/Ball/I Love You/  
Bike/Ice Cream Cone (10)

**ST 10: Pattern Perception (1-syllable/Trochees/Spondees/3-syllable words)**

SHOW ME: Bee/Ice Cream Cone/Apple/Bike/  
Sunshine/High Chair/Ball/  
I Love You/Bike/Birthday Cake/  
Airplane/Cookie/Ice Cream Cone/  
Baby/High Chair (15)

**ST 11: Spondee Recognition**

No Carrier Phrase: Bathtub/Baseball/Toothbrush/  
Ice Cream/High Chair/Sunshine/  
Mushroom/Rainbow/Cupcake (9)

**ST 12: 1-syllable Word Recognition**

No Carrier Phrase: Boat/Bee/Boot/Bike/Bird/Ball/  
Box /Belt/Bus (9)

**ST 13: One Critical Element**

Practice: “Show me”: Boot / Box / Bus / **Bed**

“Show me”: Star / **Jar** / Shark / Car

“Show me”: Pen / Pants / **Plane** / Paint

“Show me”: **House** / Fish / Couch / Mouse

“Show me”: Flag / **Fox** / Fork / Fruit

“Show me”: **Kite** / Key / Ear / Cap

“Show me”: Bear / Pear / Hair / **Stairs**

“Show me”: Desk / Dog / **Duck** / Deer

“Show me”: Socks / **Blocks** / Rocks / Locks

“Show me”: Snake / Snail / Swing / **Snow**

“Show me”: **Cat** / Jar / Cap / Hand (10)

**ST 14: Two Critical Elements/Phrase Recognition**

"Show me": Dirty Shoe / Clean Shoe / Dirty Boot / Clean Boot  
"Show me": Red Octopus / Blue Octopus / Red Starfish / Blue Starfish  
"Show me": Large Star / Small Star / Large Sun / Small Sun  
"Show me": Broken Airplane / New Airplane / Broken Helicopter / New Helicopter  
"Show me": Fat Cat / Skinny Cat / Skinny Bat / Fat Bat  
"Show me": Small Dog / Big Dog / Small Cat / Big Cat  
"Show me": Short Snake / Long Snake / Short Train / Long Train  
"Show me": Young Boy / Young Girl / Old Man / Old Lady  
"Show me": Fast Train / Slow Car / Slow Boat / Fast Rocket  
"Show me": New Car / Old Car / Blue Car / Green Car

(10)

**ST 15: Sequencing Three Events (Quiet)**Practice Sequence Items:

LISTEN:

- P1. The family went to the zoo.
- P2. They saw elephants and tigers.
- P3. The family went on the zoo train

Test Items:

LISTEN:

1. A boy and his mother were in the car.
2. A train came to the intersection with the road.
3. A man on the red caboose waved to the stopped car.

LISTEN:

4. Three pigs were playing in the barnyard.
5. They ate vegetables and nuts.
6. After dinner the pigs rolled in the mud.

LISTEN:

7. A young girl went to the lake with her fishing pole.
8. The child caught a big fish.
9. Mommy cooked the fish for supper or dinner.

(9)

**ST 16: Listening Comprehension (Quiet)**Practice Story:

LISTEN: *All skunks are black and white, but some are striped and some are spotted. They are not harmful unless they become frightened. When they are frightened, they usually stomp their feet before spraying. The spray smells horrible! Skunks love to eat turtle eggs.*

## ST 16: Listening Comprehension (Quiet)

(continued)

### Practice Items:

1. What animal was the story about?
2. What two colors are this animal?
3. What does a skunk do before it sprays?
4. How does a skunk “feel” before spraying?
5. Skunks love to eat what kind of eggs?

### Story 1:

LISTEN: *Penguins spend most of their lives swimming in the cold waters of the South Pole. These birds float on large slabs of ice. They do have wings but cannot fly. They can swim under water like fish and use their wings as paddles. Penguins eat all kinds of fish and most enjoy eating crabs.*

1. What animal was the story about?
2. What do penguins float on?
3. How do penguins get around?
4. Penguins eat all kinds of \_\_\_\_\_?
5. A penguin’s favorite food is what?

### Story 2:

LISTEN: *A little boy needed a haircut. His Daddy drove him to the mall where there was a barbershop. Outside the storefront was a red, blue, and white striped pole. A very nice young lady cut his hair. His father paid for the haircut and the boy was given a sticker for being so brave.*

6. Who needed a haircut?
7. Who took the boy to the barbershop?
8. Where was the haircut shop?
9. Who cut the boy’s hair?
10. What did the child get for being so brave?

### Story 3:

LISTEN: *Daddy asked his daughter about her day in kindergarten. The girl said that she and the other children first sang some songs and then had milk and cookies for “snack.” After the snack, each child drew a picture with crayons. Then the class went outside for recess and played on the swings. The school bus took the girl home.*

11. Who went to kindergarten in the story?
12. Who asked the girl about her day in school?
13. What was their snack?
14. What did they play at recess?
15. How did the girl get home from school?

(15)

### ST 17: Sequencing Three Events in Noise (+10 Signal-to-Noise Ratio/SNR)

#### Test Items:

LISTEN:

1. Daddy baked a chocolate cake.
2. He then put icing or frosting on the cake.
3. The young girl licked the bowl and spoon.

LISTEN:

4. A young boy was running on the sidewalk.
5. He fell down and hurt his knee.
6. Daddy put a bandage on the boy's knee.

LISTEN:

7. The little girl and boy planted some flower seeds.
8. Every day the little boy water the seeds in the plot.
9. With plenty of sunshine, the flower grew to be taller than the little girl.

(9)

### ST 18: Listening Comprehension in Noise (+5 SNR)

#### Story 1:

LISTEN: *More than 70 different species of squirrels have been identified throughout the world. In the United States, the most common type is the gray squirrel. One unique type is the flying squirrel which is able to glide long distances and sail through the air. One forest animal related to the squirrel is the chipmunk, which is actually a ground squirrel.* [adapted from Kratoville, 1973]

1. What animal was the story about?
2. How many different species of squirrels have been identified?
3. What color is most common for the majority of these animals?
4. Which squirrel can glide long distances?
5. What animal is really a ground squirrel?

#### Story 2:

LISTEN: *The bald eagle is the national bird and symbol of the United States. Eagles build their nests at high elevations along the side of mountain cliffs. Magnificent flyers, they soar long distances and to great heights. The wingspan of some eagles can be as much as 7 feet. When they see even small prey, eagles swoop down, and lift and carry away small animals including rabbits and lambs.* [adapted from Kratoville, 1973]

6. What animal was the story about?
7. The eagle is the bird and symbol for what nation?
8. Where do you find this animal's nests?
9. The wingspan of an eagle can be up to how many feet?
10. What two animals might an eagle pick up and carry away for feeding?

(10)

## ST 19: Listening Comprehension in Noise(0 SNR)

### Story 1:

LISTEN: *A chicken egg takes 21 days to hatch. The shell is quite hard for protection and is kept in a soft nest to help keep it safe. An egg will only hatch if the surrounding air is warm and moist -- about 100 degrees. A hen sits over the egg to keep the shell warm. Inside the egg is the yolk which is food for the growing chick. Finally, when it's time, the baby chick uses a sharp point on its beak (the "eye tooth") to help crack open the egg. When the feathers dry, one sees that the chick is yellow and fluffy.*

(adapted from Learning Horizon, 2003)

1. What animal was this story about?
2. How many days does it take for a chick egg to hatch?
3. On what does the hen put the egg?
4. What season might have the best temperatures for a chick to be born?  
[NORTHERN HEMISPHERE]
5. With what does a baby chick use to help break the egg shell?

### Story 2:

LISTEN: *Once upon a time there lived a rabbit and an alligator. On the third day of meeting each morning, Alligator invited Rabbit to his house for dinner. That evening, when Rabbit arrived for dinner, he became very nervous as no meal appeared ready to be served -- so he quickly left. Later, Rabbit heard sounds coming from Alligator's house. Rabbit came closer to the house and heard Alligator sadly crying that he was starving as he had no food to eat. Rabbit had plenty of food, so he invited Alligator over to his house. To everyone's surprise, Alligator and Rabbit became good friends!*

(adapted from Sarah Poelking, 2019)

6. Who were the two animals in the story?
7. On which day did Alligator invite Rabbit over for dinner?
8. What meal did Rabbit plan to have with the Alligator?
9. How did the Rabbit feel when he realized no dinner was going to be served?
10. What was Alligator doing when Rabbit heard sounds that Alligator had no food to eat?

(10)

## Appendix C

### **TEST OF AUDITORY FUNCTIONING**

#### **SUMMARY SCORE SHEET**

Name: \_\_\_\_\_

Date of Birth: \_\_\_\_/\_\_\_\_/\_\_\_\_. Age: \_\_\_\_years; \_\_\_\_months (\_\_\_\_;\_\_\_\_)

Test Date: \_\_\_\_/\_\_\_\_/\_\_\_\_

Calibration completed before the administration of the “opening” subtest:

Yes \_\_\_\_ No \_\_\_\_

#### **TOTAL Scores:**

#### **Subtest Title:**

Subtest 1a: \_\_\_\_  
or 1b: \_\_\_\_/10

Duration Discrimination

Subtest 2: \_\_\_\_/10

Pitch Discrimination

Subtest 3: \_\_\_\_/10

Male vs. Female / Fundamental Frequency Discrimination

Subtest 4: \_\_\_\_/10

Male vs. Female vs. Child / Fundamental Frequency Recognition

Subtest 5: \_\_\_\_/9

Environmental / Familiar Sounds Recognition

Subtest 6a \_\_\_\_

Ling Six Sounds/Frequency Recognition

or 6b: \_\_\_\_/15

Subtest 7: \_\_\_\_/10. Learning to Listen Associated Sounds - Animals

Subtest 8: \_\_\_\_/10. Learning to Listen Associated Sounds - Vehicles

Subtest 9: \_\_\_\_/10. Pattern Perception (1- vs. 3-syllable words)

Subtest 10: \_\_\_\_/15. Pattern Perception (1-syll. / Trochees / Spondees / 3-syll. words)

Subtest 11: \_\_\_\_/9. Spondee Recognition

Subtest 12: \_\_\_\_/9. 1-Syllable Word Recognition

Subtest 13: \_\_\_\_/10. One Critical Element / Word Recognition

Subtest 14: \_\_\_\_/10. Two Critical Elements / Phrase Recognition

Subtest 15: \_\_\_\_/9. Sequencing Three Events (Quiet)

Subtest 16: \_\_\_\_/15. Listening Comprehension (Quiet)

Subtest 17: \_\_\_\_/9. Sequencing Three Events in Noise (+10 Signal-to-Noise Ratio)

Subtest 18: \_\_\_\_/10. Listening Comprehension in Noise (+5 SNR)

Subtest 19: \_\_\_\_/10. Listening Comprehension in Noise (0 SNR)

Total: \_\_\_\_/200

## Report Write-Up *Recommendation*

**PATIENT NAME** was administered the *Test of Auditory Functioning (TAF)*, a criterion-based assessment tool for children who are d/Deaf or Hard of Hearing. Test administration was completed following the calibration of the intensity level (“loudness”) of the audiofiles utilized in testing (76 dBA – a level slightly above that of “normal” conversational speech – at the position of the guest’s head).

Testing began at Subtest # and proceeded through Subtest #. Respective subtest scores are noted on the TAF Summary Sheet above. Full credit was awarded for all subtest items that were not administered, below the first subtest that was initially PASSED. The Total TAF score reflects the total number of items credited below the initially passed subtest, plus all the additional correct items, with the maximum score of 200.

### A brief description of each of the Subtests follows:

| <u>Subtest Title</u>                                                                                                         | <u>Brief Description / Stimuli</u>                                                                                                          |
|------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Subtest <u>1</u> <b>Duration Discrimination</b><br><u>1a</u> : PEDIATRIC version<br>or <u>1b</u> : ADULT version             | Long versus Short:<br>race car/“vroom” v. bunny/“hop hop hop”<br>“ahhh” v. “ah ah ah”                                                       |
| Subtest <u>2</u> : <b>Pitch Discrimination</b>                                                                               | High versus Low: drum v. whistle                                                                                                            |
| Subtest <u>3</u> : <b>Male vs. Female /Fundamental Frequency Discrimination</b>                                              | “Hello, my name is Reagan”                                                                                                                  |
| Subtest <u>4</u> : <b>Male vs. Female vs. Child / Fundamental Frequency Recognition</b>                                      | “Hello, my name is Reagan”                                                                                                                  |
| Subtest <u>5</u> : <b>Environmental /Familiar Sounds Recognition</b>                                                         | Sounds include--alarm clock, cell phone, microwave, bike horn, water rushing, vacuum, toilet flush, motorcycle revving, dog barking.        |
| Subtest <u>6</u> <b>Ling 6 Sounds/Frequency Recognition</b><br><u>6a</u> : PEDIATRIC version<br>or <u>6b</u> : ADULT version | Sounds include—oo, mmm, ah, ee, sh, sss                                                                                                     |
| Subtest <u>7</u> : <b>Learning to Listen Associated Sounds: Animals</b>                                                      | Sounds include –quack quack, mooo, neigh, meow, baaa, bawk, bawk, bawk                                                                      |
| Subtest <u>8</u> : <b>Learning to Listen Associated Sounds: Vehicles</b>                                                     | Sounds include –“raspberries”/helicopter, puh puh puh/boat, beep beep beep/truck, chooo chooo/train, ah/airplane, wee ooo wee ooo/firetruck |
| Subtest <u>9</u> : <b>Pattern Perception (1- vs. 3-syllable Words)</b>                                                       | Example: bee v. birthday cake                                                                                                               |
| Subtest <u>10</u> : <b>Pattern Perception (1-syll. / Trochees/Spondees/ 3-syll. Words)</b>                                   | Examples: bee, baby, sunshine, birthday cake                                                                                                |

|                                                                                              |                                                                                                                                                                                                                   |
|----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Subtest <u>11</u> : <b>Spondee Recognition</b>                                               | Examples: sunshine, ice cream, high chair, bathtub, rainbow, toothbrush, cupcake, baseball, mushroom                                                                                                              |
| Subtest <u>12</u> : <b>1-Syllable Word Recognition</b>                                       | Examples: bee, ball, bike, boat, boot, bus, box, bird, belt                                                                                                                                                       |
| Subtest <u>13</u> : <b>Word Recognition: One Critical Element</b>                            | Examples: boot, bus, box, bed<br>"Show me BED" (field: 4 images)                                                                                                                                                  |
| Subtest <u>14</u> : <b>Phrase Recognition: Two Critical Elements</b>                         | Example: dirty shoe, clean shoe, dirty boot, clean boot<br>"Show me DIRTY SHOE"                                                                                                                                   |
| Subtest <u>15</u> : <b>Sequencing Three Events (Quiet)</b>                                   | 3-sentence story presented auditorily.<br>Then asked: What happened first? What happened next?/second? What happened last?                                                                                        |
| Subtest <u>16</u> : <b>Listening Comprehension (Quiet)</b>                                   | Story presented auditorily, then 5 questions asked.                                                                                                                                                               |
| Subtest <u>17</u> : <b>Sequencing Three Events (Noise) (+10 Signal-to-Noise Ratio / SNR)</b> | 3-sentence story presented auditorily, with the intensity of the speaker's voice 10 dB ABOVE the multi-speaker background noise. Then asked: What happened first? What happened next?/second? What happened last? |
| Subtest <u>18</u> : <b>Listening Comprehension (Noise) (+5 SNR)</b>                          | Story presented auditorily, with the intensity of the speaker's voice 5 dB ABOVE the multi-speaker background noise. Followed by 5 questions asked.                                                               |
| Subtest <u>19</u> : <b>Listening Comprehension (Noise) (0 SNR)</b>                           | Story presented auditorily, with the intensity of the speaker's voice equally as loud as the multi-speaker background noise. Followed by 5 questions asked.                                                       |