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SIMPLE & EFFECTIVE

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Words- in- Noise Training 3 (WINT- 3)

INSIDE THIS ISSUE

As you well know, difficulty understanding in a noisy environment is a common complaint whether the person has APD or a hearing loss (especially unilateral losses). In my sample of almost 200 children, 6-18 years of age, 65% indicated difficulty understanding speech-in-noise (SN) on the Buffalo Model Questionnaire.

After 40 years of doing therapy with this problem and what I see in the literature it is clear that SN difficulty is surely a treatable condition. The program that I use is Words-in-Noise-3 (WINT-3).

There are two WINT programs.

1. WINT-1
    a. does not require an audiometer (just a CD player)
    b. is commercially available[1].
2. WINT-3
    a. uses an audiometer in conjunction with a CD player
    b. I am hoping that this is now commercially available (minus the manual that I am working on).

This issue of SET will be devoted to WINT-3

Principals of WINT Procedures

The SN training principles for WINT procedures are straightforward:

1. Set speech to a comfortable level

Noise generally goes to the same transducer(s) (although it could be presented through separate loudspeakers): loudspeaker/s or earphone/s.

2. Start speech with no background noise

3. Increase the noise level in gradual steps until the noise is at 0dB Signal-to-Noise-Ratio (SNR).

However, if there are many errors you may wish to stop sooner.

[1] Upstate Advanced Technologies <gbusat@frontiernet.net>

Purpose

The purpose of WINT is to improve the person's word understanding in noise. Generally the individuals experience reduced discomfort in noise and are better able to resist distraction. This is not meant to be used for hyperacousis *per se*, although we often find that those who have this therapy report reduced hypersensitivity to noise.

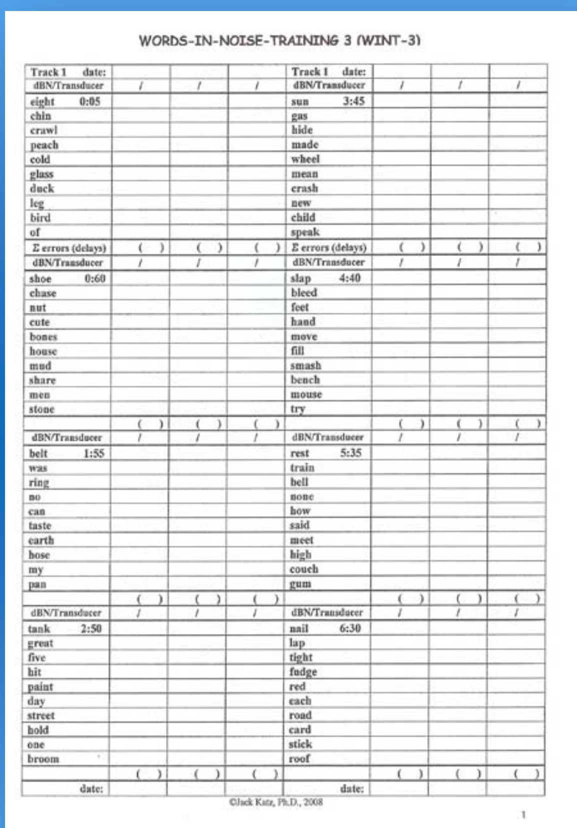
Equipment and Materials

WINT-3 CD has two separate channels; one with speech (primarily simple monosyllabic words) and the other with noise (8-speaker babble). The audiometer enables the audiologist to manipulate the SNRs. WINT-3 requires a good quality CD player as well as an audiometer to combine the speech and noise and to deliver them to either loudspeaker/s or earphone/s.

There are two forms that we use with WINT.

(Full size versions of these forms can be found on the last pages of this newsletter.)

One form is the score sheets on which the WINT words are listed (see Figure 1).



WORDS-IN-NOISE-TRAINING 3 (WINT-3)

Track 1 date:				Track 1 date:			
dBN/Transducer	/	/	/	dBN/Transducer	/	/	/
eight 0:05				sun 3:45			
chin				gas			
crawl				hide			
peach				made			
cold				wheel			
glass				mean			
duck				crash			
leg				new			
bird				child			
of				speak			
Σ errors (delays)	( )	( )	( )	Σ errors (delays)	( )	( )	( )
dBN/Transducer	/	/	/	dBN/Transducer	/	/	/
shoe 0:60				slap 4:40			
chase				bleed			
nut				feet			
cute				hand			
bones				move			
house				fill			
mud				smash			
share				bench			
men				mouse			
stone				try			
	( )	( )	( )		( )	( )	( )
dBN/Transducer	/	/	/	dBN/Transducer	/	/	/
belt 1:55				rest 5:35			
was				train			
ring				bell			
no				none			
can				how			
taste				said			
earth				meet			
hose				high			
my				couch			
pan				gum			
	( )	( )	( )		( )	( )	( )
dBN/Transducer	/	/	/	dBN/Transducer	/	/	/
tank 2:50				nail 6:30			
great				lap			
five				tight			
hit				fudge			
paint				red			
day				each			
street				road			
hold				card			
one				stick			
broom				roof			
	( )	( )	( )		( )	( )	( )
date:				date:			

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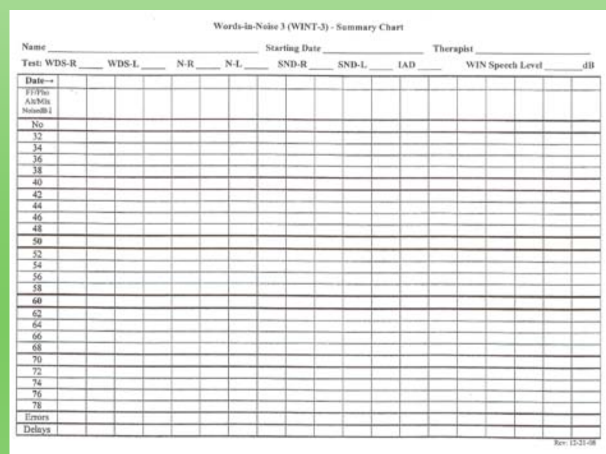
1

Figure 1. Score sheet for WINT-3.
Enter the date at the top or bottom of the column and for dBN enter the noise level and for the transducer indicate the ear or FF for *free field*

The other is a summary form (Figure 2) where the results of the therapy are recorded.



Words-in-Noise 3 (WINT-3) - Summary Chart

Name ______ Starting Date ______ Therapist ______

Test: WDS-R ____ WDS-L ____ N-R ____ N-L ____ SND-R ____ SND-L ____ IAD ____ WIN Speech Level ______dB

Date→
FF/Pho Alt/Mix Noise dB-1
No
32
34
36
38
40
42
44
46
48
50
52
54
56
58
60
62
64
66
68
70
72
74
76
78
Errors
Delays

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Figure 2. Words-in-Noise Summary form to record performance on WINT-3 across the various lessons. Each column is used for a series and the number of errors can be entered on the appropriate line for the noise dB level. Delays are then entered to the right in parentheses "(2)".

A 'series' is a group of sublists (10 words that are delivered at a particular SNR) that almost always start with no noise and work up to greater amounts of noise with speech maintained at the same comfortable loudness level.

Notation of Responses

When the person is correct:

I have found a dot to be the most efficient way to designate a correct response on the WINT score sheet. It indicates that you gave the item and that the response was correct.

I also indicate if there was a delay (with a circled x before the dot) on a correct response to provide additional information and later tally both the number of errors and delays.

When there are errors:

When the person is in error we write in the error word or if it is not clear what the response was onto the WINT score sheet. We can use phonetics or diacritical marks.

Unlike the SSW; adding or deleting an /s/ or /z/ sound is considered an error for WINT and SN testing.

Initially, I do not repeat the error word because I would like to establish the person's base level. But after 2 series or so the therapist can institute some procedures to aid the person to understand their errors and to improve their processing in noise.

Repair Procedures:

When there is an error that you think can be improved you can:

- simply repeat the item if you think this might do the trick
- give some extra direction before repeating the item or after the item was missed a second time (e.g., *listen to the first sound* or *listen to the vowel* etc.)
- if it does not appear that the person will get it on his/her own you can say the actual word once or twice and then again just before it is presented from the CD

- If the person disputes your indication of the word or sound you can turn off the noise channel and the person will hear just the speech which should reveal the correct word
  - it may not be warranted but if you wish you can replay the item a few times while adding noise gradually
  - Several replays of the word may not be warranted but if so it would be interesting at what level of noise the speech reverted to the error.

In general, it is best if the person says the correct word even if it is not heard correctly.

Alternate Procedure:

The Alternate procedure (Alt) is used to compare the performance if each ear. Whether there was a difference between ears on the regular speech-in-noise test or not it is a good idea to check equality under these conditions. It can be done efficiently by presenting 2 sublists to the right ear, for example, and then 2 to the left ear in the following manner (Table 1).

Start Alt with no noise to the first ear and then a fairly low level (about +12dB SNR) where you might begin the noise presentations. If speech level is 62dB HL then you might begin the noise at 50dB HL. For the next 2 sublists switch to the other ear (repeating 50dB and then increasing it to 52dB and then switching back to the first ear with 52dB). Continue the procedure to the highest level of noise (0dB SNR) which in this case would be 62dB.

At the end of the Alt procedure if one ear had 8 errors and the other had 14 it would appear that there is indeed a difference in performance between ears. In such a case you might address the problem with therapy (next SET issue). If one ear has 12 errors and the other 13 then it is very likely that there is no significance between the right and left ears. If unsure repeat the Alt procedure but reverse the ears (e.g., start with the left ear).

For Tracks 1 - 7		
Sublist	Right Ear	Left Ear
1	No Noise	
2	50	
3		50
4		52
5	52	
6	54	
7		54
8		56
etc.	etc.	

Table 1. Alternate procedure is used to determine if the 2 ears are performing similarly. In this example one sublist is presented to the right ear with no noise and the next sublist at 50dB of noise. Then 50dB of noise is delivered to the left ear as well as 52dB for the next sub-list. Continue till 0dB SNR for both ears.

Results

WINT results can be plotted to show the progress or the lack of progress (infrequently) that the person is making.

Figure 3 shows a typical pattern (for 60 children) on various speech-in-noise programs over the past 6 years. Because each sublist may have fewer/more difficult items I usually start the program at different tracks on the CD. In this way the curve is less likely to be item related.

You can see a fairly rapid and then gradual improvement in the total score of over the 15 series in round-1 of therapy.

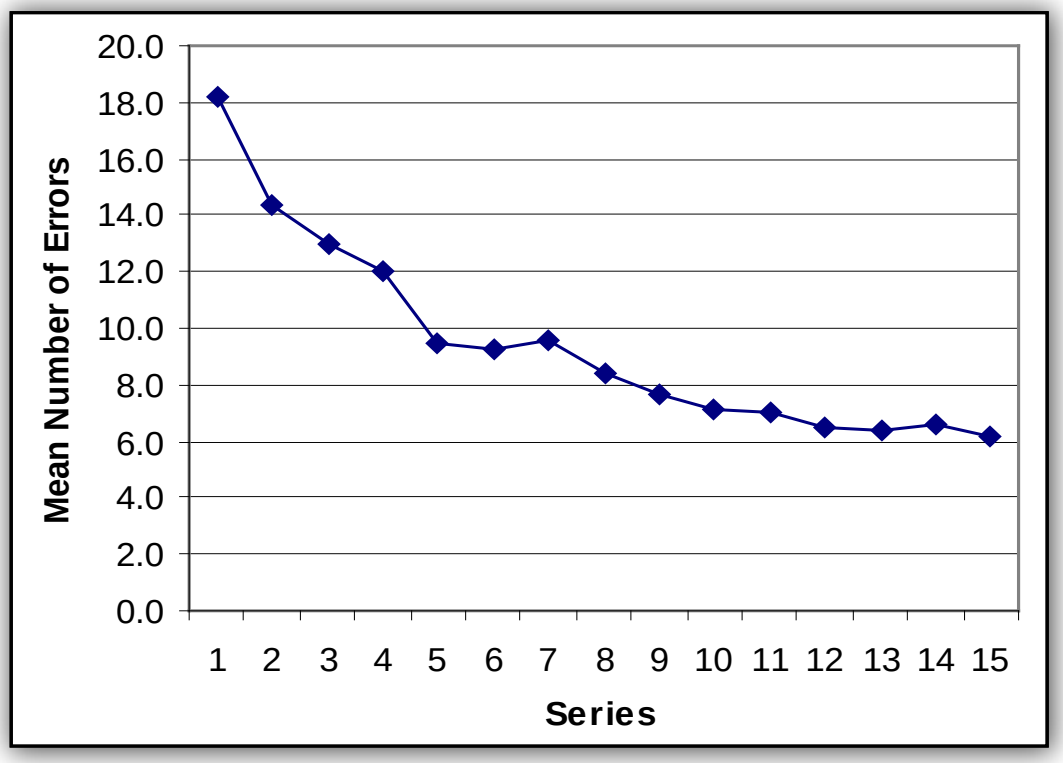

Figure 3. Results for 60 children ages 5 to 16 years with a mean of 8.8 years

For those who completed the therapy program before the 15th series their final score was added to the remaining blank spaces. Otherwise only the poorer- performing children would be represented on the graph.

An interesting aspect of this therapy is that those who had the poorest scores initially on WINT-3 made the most improvement. This was not only numerically which would be quite logical, but also the percent of improvement.

Figure 4 shows data for test and retest on the standard SN test that was administered before and after round-1 of therapy. There was a nearly 50% reduction in errors following therapy.

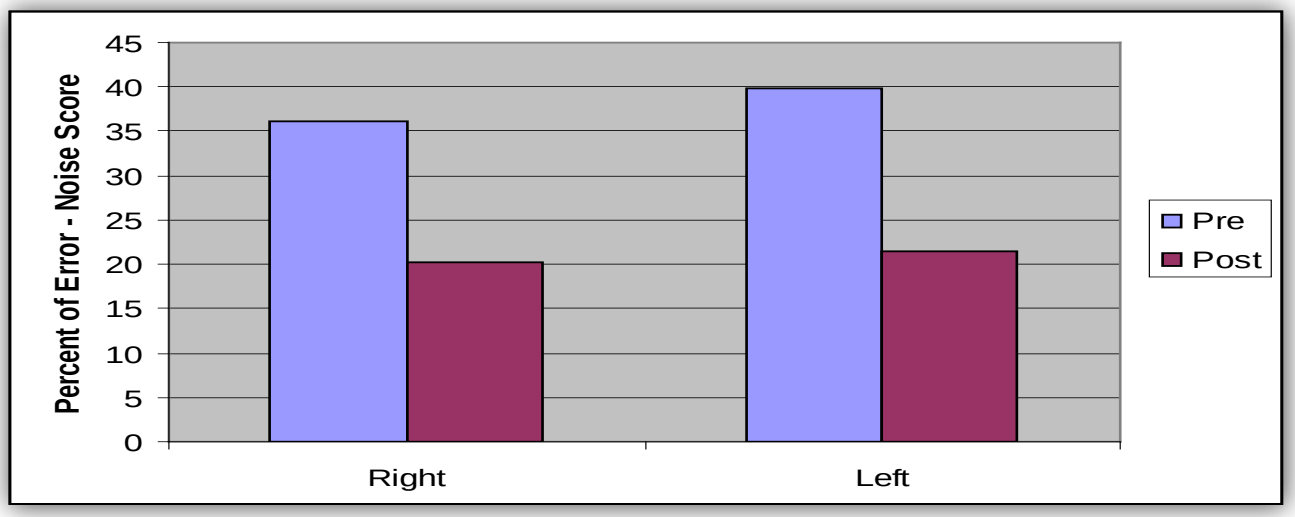

Figure 4. Test-retest results for 85 subjects 5-20 years of age on the Speech-in-Noise test for each ear before and after therapy.

The parents of these children also rated quite favorably the noise related questions that were of concern to them initially.

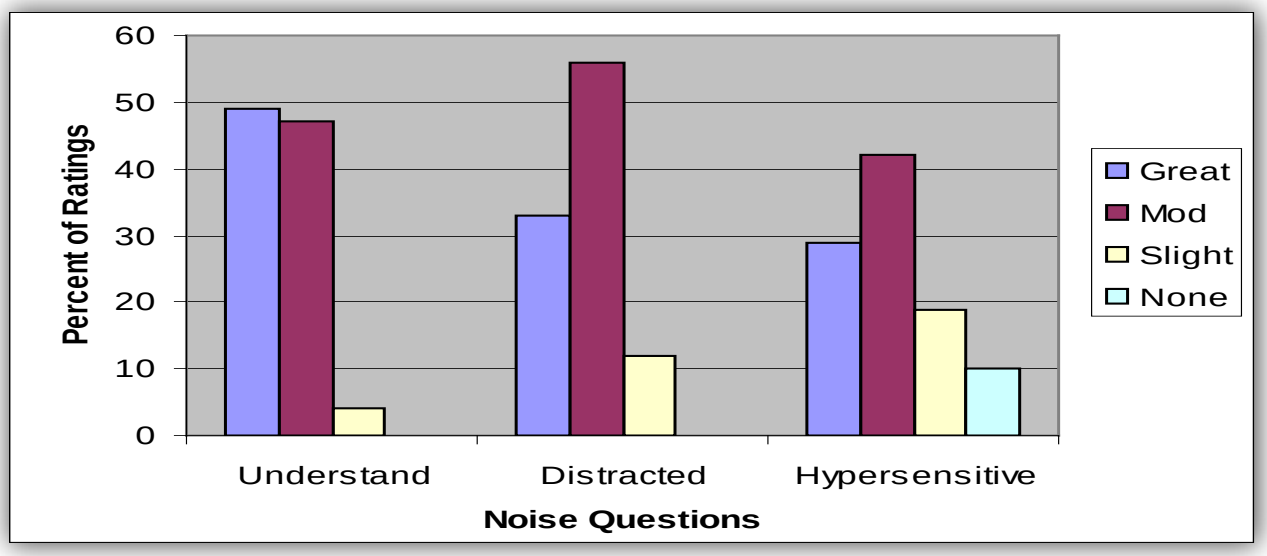

Figure 5. Parent assessments of improvement in noise related issues

Figure 5 shows the 3 questions from the Buffalo Model Questionnaire that relate to SN issues. The ratings were Great, Moderate, Slight or None. For *understanding speech in noise,* which is the most important question, 96% of the responses indicated great or moderate improvement. The next most important question was whether the child was *distracted by noise*. 89% indicated moderate or great improvement. For the question of *hypersensitivity* 71% of the responses with moderate or great. Thus, the therapy materials as well as the test-retest and parent assessments all show fine improvement for children following round-1 of therapy.

Our next issue will relate to other aspects of WINT-3 training. This will include unilateral problems and the importance of delays.

Figure 1. Score Sheet for WINT- 3

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Track 1 date:				Track 1 date:			
dBN/Transducer	/	/	/	dBN/Transducer	/	/	/
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of				speak			
Σ errors (delays)	( )	( )	( )	Σ errors (delays)	( )	( )	( )
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shoe 0:60				slap 4:40			
chase				bleed			
nut				feet			
cute				hand			
bones				move			
house				fill			
mud				smash			
share				bench			
men				mouse			
stone				try			
	( )	( )	( )		( )	( )	( )
dBN/Transducer	/	/	/	dBN/Transducer	/	/	/
belt 1:55				rest 5:35			
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dBN/Transducer	/	/	/	dBN/Transducer	/	/	/
tank 2:50				nail 6:30			
great				lap			
five				tight			
hit				fudge			
paint				red			
day				each			
street				road			
hold				card			
one				stick			
broom				roof			
	( )	( )	( )		( )	( )	( )
date:				date:			

Figure 2: Words in Noise Summary Chart

Words-in-Noise 3 (WINT-3) - Summary Chart

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Date→																			
FF/Pho Alt/Mix NoisedB↓																			
No																			
32																			
34																			
36																			
38																			
40																			
42																			
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