SSW
SSW

REPORTS

PBS YIELDS TO SSW PRESSURE

Vol. 11 No. 2 May 1989

THE USE-MISUSE OF THE SSW TEST

Jack Katz

We live in a free country (if not completely free, I'd say rather inexpensive). We don't condemn people to death for misusing an audiometric test. I'm delighted that we live in a pluralistic society even though some people are going to misuse or underuse the SSW test.

If you are desperately trying to figure out what this column is all about, it's this: The SSW (if used properly) is studied at 3 levels of performance (okay, then at least 2 levels).

Three Levels of Analysis

1. Like most audiometric tests, the SSW should be analyzed quantitatively (e.g., evaluating the four Condition scores). Depending on the application, one might need to analyze the Ear and Total scores (for TEC) as well. What you are looking for and who you are working with, will determine whether you will look at the R-, C- and/or the A-SSW quantitative results.

2. The next level of the SSW is that of response bias. While most audiologists don't look for refined patterns like Order Effects on other tests, deep and shallow tympanograms as well as interwave latencies on the ABR represent comparable refinements. Response bias contributes so much information to the SSW findings that one significantly minimizes the power and the specificity of the test by ignoring these indicators.

3. The third level of analysis is that of qualifiers, which are analyses of the individual's test behavior. Qualifiers are much like Bruce Porch's scoring procedures for evaluating aphasic patients and language impaired children. They also correspond to the response-time measures that have been employed by audiologists. SSW qualifiers include quick and delayed responses, tongue twisters, smushes and silent rehearsals (among others). These provide support for both the qualitiative findings and for the response biases.

A Look at the Literature

It is likely that those of you who have taken an SSW Workshop read the SSW literature with more sophistication than the general readership. Recently, a friend mentioned a paper by Olsen (1983) as not being supportive of the SSW test. I felt just the opposite, despite the author's contention. The author made one major error in dealing with the quantitative analysis and then ignored the necessary response bias analysis needed to locate the stated site-of-lesion.

Olsen evaluated 67 temporal lobectomy patients on the Dichotic CV test. The extent of the temporal lobe sections varied from 40 to 65 mm. According to the calculations of Katz & Pack (1975) the AR centers are generally about 60 - 70 mm from the temporal pole. Thus, those who use the SSW would probably classify most of Olsen's cases as having non auditory reception (NAR) lesions. That is, they have involvement of the anterior and possibly the middle temporal lobe region. It is reasonable to assume that one or more might also have involvement of the auditory reception (AR) centers when 65 mm were removed. From those who did poorly on the Competing CVs, he selected 7 right and 7 left temporal lobectomy cases for evaluation with the SSW.

For the past 2 decades we have distinguished between auditory reception (AR) and NAR cases by using quantitative SSW scoring (Katz, 1968). As you know, it's the AR cases that have the poor (moderate/severe) SSW scores and not the NARs (who have normal or mild scores). Thus, cortical lesion cases should have relatively normal scores if the AR centers are spared (and this includes the anterior temporal region).

Olsen found only 5 of the cases to have abnormal SSW scores (after surgery) using Lynn & Gilroy's criterion of 10% for the competing SSW Conditions. We do not know if the scores would have been classified as N, MI, MO or S, but it seems reasonable that some had MI scores and perhaps one (or 2) had a MO or S score (assuming that at least one case had removal in the 60 - 65 mm region), and if the standard TEC criteria were used.

Had Olsen found a large number of MO or S scores in his anterior temporal group, this would fly in the face of the literature. However, for the SSW, the anterior temporal area is NAR with normal or MI scores. To locate a lesion of the anterior temporal region, one should use the response bias information (e.g., Order Effect H/L or Ear Effect L/H) and not the quantitative score (Arnst, 1982; Wetherby et al., 1981; Katz, 1976, 1978; Winkelaar & Lewis, 1977).

In Olsen's behalf, it is fair to say that many people do not take advantage of response biases. Many do not feel confident in calculating them, while others doubt their validity. Those of you who use reponse biases know full well how effective they are. They provide a rapid differentiation of cerebral dysfunctions (e.g., anterior cerebral vs. posterior temporal). In CAP cases they also aid in categorizing problems into three major groups, based on brain localization data (Katz & Smith, 1989).

Some Observations

I have an expression that comes to mind when people underuse or misuse the SSW -- You don't know, what you don't know, until you know it! One can only suggest and hope that people are willing to listen. If you don't use response biases, try them. If you already use response biases, then give qualifiers a chance. For further information about qualifiers, see Katz (1987a & b); Katz, Yeung & Medwetsky (1988).

You may be correct in thinking that no country is completely free and, in fact, that nothing in life is free. Unfortunately, I cannot argue with that. But, response biases and qualifiers are nearly free and the small cost in time is more than offset by the valuable information that you obtain from them. Because we live in a pluralistic society, if after careful consideration you decide not to try response biases and qualifiers, we promise not to send a hit squad. There is plenty of room for differences of opinion about the SSW test among people of good will.

REFERENCES

*Arnst (82). Overview of the SSW test and CES test. In Arnst & Katz (Eds), The SSW Test, College-Hill Press.
*Katz (68). The SSW test: an interim report. JSHD, 33, 132-146.
* (76). Localizing lesions of the brain and brainstem. Short course: ASHA Convention, Houston.

*Katz (78). SSW Workshop Manual, Rev. Ed., Allentown Industries.
* (87a). Qualifiers and the SSW test. SSW Reports, 9, 1-6.
* (87b). SSW Workshop Manual, 3rd Ed., JIMM Co.
* & Pack (75). New developments in differential diagnosis using the SSW test. In Sullivan (Ed), Central Auditory Processing Disorders, University of Nebraska Press.
* & Smith (89 in press). A ten minute look at the CNS through the ears. In Zappula (Ed), Windows on the Brain: New Frontiers in Neuropsychology, New York Academy of Science Press
* , Yeung & Medwetsky (88). SSW C*I*R (computer program), JIMM Co.
*Lynn & Gilroy (72). Neuroaudiological abnormalities in patients with temporal lobe tumors. J Neurol Sci, 17, 167-184.
*Olsen (83). Dichotic test results for normal subjects and for temporal lobectomy patients. Ear Hear, 4, 324-30.
*Wetherby, Koegel & Mendel (81). CNS system dysfunction in echolalic autistic individuals. JSHR, 24, 420-29.
*Winkelaar & Lewis (77). Audiologic tests for evaluation of central auditory disorders. J Otolaryng, 6, 127-134.

****

PBS YIELDS TO SSW PRESSURE

Word has reached us that the Public Broadcasting System (PBS) will be replacing their widely acclaimed series "Upstairs Downstairs" with a healthier program (according to the SSW) "Upstairs Downtown".

After years of negotiation we have convinced them that the title "Upstairs Downstairs" is an error (specifically a LNC error) and should not be perpetuated. We explained to them that their title constituted a LNC substitution, suggestive of poor decoding skills. They soon began to realize that they were setting a bad example for children by publicizing this error. For example children might pick up this error as they do the word "ain't" when listening to TV.

All is not yet well with the world. Instead of having reruns of "Upstairs Downtown", PBS is simply going to run the tape backwards and call the program "Downtown Upstairs". Cynics will tell you, you can't win.

****

ACADEMIC AND BEHAVIORAL PROBLEMS IN LEARNING DISABLED CHILDREN: PART I

Jack Katz, Paula S. Smith &
Barbara Kurpita

As you may recall, in the February issue of SSW Reports, Katz & Smith categorized CAP disorders into three major groups: 1) Tolerance-Fading Memory; 2) Phonemic Decoding, and; 3) Integration (primarily auditory-visual). Such a categorization may be helpful in understanding a person's difficulties, determining a management strategy and in grouping problems to gain further insight into their etiology and underlying mechanisms.

A follow-up study is under way to cross-validate the Katz & Smith findings and to determine whether additional categories or subcategories exist, and to identify corresponding academic and/or behavioral patterns in these individuals. We plan to gather data for a large number of LD cases from a variety of locations and test settings in both the United States and Canada.

METHODOLOGY

Evaluators

Nine audiologists agreed to be co-investigators on this project. Their work settings include: schools, private practices, clinics, hospitals and universities. All of the audiologists meet the following criteria:

1. Experienced in CAP testing, and attended one or more SSW Workshops.
2. Will use the specified test battery (as a minimum) along with the parent and school questionnaires that were developed for this project.

3. Will submit consecutive eligible subjects to minimize sample bias, and
4. Will obtain Institutional Human Subject Review Committee and Administration approval.

<u>Subjects</u>

Subjects in this study will meet the following criteria:

1. Will be 6 - 15 years of age.
2. Will have no history of neurological disorders (e.g., cerebral palsy, skull trauma with unconsciousness or mental retardation).
3. Will have puretone thresholds of 25 dB or better from 250 - 8000 Hz (no specific criterion was established at 6000 Hz).
4. Tympanograms will be within the range of +50 to -200 mm H_2O (or patent PE tubes) in each ear.

<u>Test Battery and Subject Information</u>

Information that is collected from the co-investigators is being stored in a computer database. The peripheral battery includes: puretone air-conduction thresholds (250 - 8000 Hz, including 6000 Hz); tympanometry; contralateral and ipsilateral stapedial acoustic reflexes and recorded word discrimination scores (Hirsh recording of W-22, list 3D @ 40 dBSL).

The central auditory battery includes: SSW, list EC; Phonemic Synthesis (DLM); Speech-in-Noise (+10 S/N using Hirsh W-22, list 4D recording), and; CES (optional). Standard administration-scoring procedures are used.

Up-to-date school information is being obtained from a questionnaire filled out by school personnel. It identifies the child's classroom setting and special services that are provided (e.g., speech-language therapy, remedial reading). The child's academic performance is then rated on a scale comparing him/her to children of the same age in regular classes. Some of the areas of interest are reading, spelling, handwriting, language, math and social studies.

The parent questionnaire inquires about the child's history of ear infections (e.g., age at onset and number of bouts). The child's behaviors, attitudes and reactions in a variety of situations is also evaluated. For example, the parent is asked to indicate if the child has difficulty paying attention to instructions, has a tendency to become hyperactive, or has problems with organization. Other information about the child's speaking rate and athletic abilities are solicited.

RESULTS

Although the project has just begun and we have samples from only a few of the centers, we will include some preliminary results here. It will be interesting to see how much variation we get when we have gathered ten times this number of cases.

Our first analysis includes the first 23 cases to see if there are any major problems in our test battery or questionnaires. We found one thing that we had not expected. We had more data collection "fields" than the computer program could handle. So we have combined a few questions to save room.

The mean age for the subjects was 8.6 years. We have 15 males and 8 females. The 65% males in the sample is very much like the expected 2/3 that is commonly reported. Seventeen of the subjects are right-handed and 6 left-handed. The 26% left-handers is far above the general population. Geshwind has pointed out that many exceptionally gifted as well as dyslexic people are left handed. He suspected that the degree of left handedness might differentiate the person who has been gifted with left handedness and the person who is somewhat handicapped by it.

Mean puretone thresholds (see Table 1) are within normal limits. The thresholds cannot vary much from normal because we set the entrance criterion at 25 dB.

PURETONE AIR-CONDUCTION THRESHOLDS

	250	500	1K	2K	4K	8K
RIGHT	11	10	6	6	5	10
LEFT	10	8	5	6	5	10

Table 1. Mean puretone thresholds for 23 learning disabled subjects.

Thus far, no potential subjects were excluded from this study because of hearing. As expected, performance at 6000 Hz is poor relative to the other frequencies. At this frequency the means are 11 dB in each ear. We do not know if the poorer thresholds are observed here because, as in most people, the 6K region of the cochlea is especially vulnerable, or if in LD cases it may be a result of middle ear pathology. Also does this deviation contribute to CAP symptoms (e.g., discriminating speech in noise)? Perhaps the results from this study will provide some further information.

On the SSW test the average performance for the 23 subjects is shown in Table 2 for each of the four Conditions. Means for 8- and 9-year-old controls are provided for comparison.

SSW CONDITION SCORES

Condition	Subjects	8-Year	9-Year
RNC:	1	1	1
RC:	11	6	4
LC:	23	10	8
LNC:	0	0	0

Table 2. Mean SSW performance for the four C-SSW Conditions is shown along with the means for normal control subjects (National Sample-1985) at comparable ages.

When we consider that the children were on the average between 8 and 9 years of age, the above scores do not look too good. The competing Conditions were more than twice as poor for the LD subjects compared to the National Sample data.

Response bias provides a great deal of information about LD individuals. Table 3 shows the number of cases with significant response biases and the percentage of failure.

SIGNIFICANT RESPONSE BIASES

	#	%
REVERSALS	7	30
EAR EFFECT	7	30
ORDER EFFECT	4	17
TYPE A	7	30

Table 3. This table shows the number of subjects (out of 23) that had significant response biases and the percent of failure.

There was an average of 5 reversals per child. As shown above, the results were significant for 30% of the subjects. This is similar to the National Sample-1986 data for LDs. In that study there were 25% of cases with significant reversals in the 8 and 9 year age groups.

The response bias data are quite similar to the findings of White (1977). She found a higher percentage of Type A's, for example, than the NS-1986. In the present sample there was an impressive 30% with Type A patterns. We were pleased to see the large number of Type A cases because we wish to investigate these subjects to see if there are subcategories of the Integration group (as we suspect there are).

The performance on the test of Phonemic Synthesis provided a mean of 16 items correct. The raw data will be studied to help us determine more about the group.

The Speech-in-Noise test was the last CAP test that we administered. The results on this procedure are shown in Table 1 compared with the WDS in quiet.

SPEECH-IN-NOISE PERFORMANCE

	RIGHT	LEFT
QUIET	95%	92%
NOISE	55%	60%
DIFFERENCE	40%	32%

Table 4. The percentage correct in quiet and in speech spectrum noise (ipsilateral competition at +10 S/N). The difference score is also shown.

From the Speech-in-Noise data above, it appears that the average subject was affected most significantly by the presence of competing noise. While we do not believe that having this test at the end of the battery had a major effect on performance, we are not able to tease out this influence in the present study. We consider a score of 55 or 60% as a moderate one and not as severe as we see in many of the Tolerance-Fading Memory cases (in one or both ears). We have noted the typical Phonemic Decoding cases to have their scores more in the range of 60s and 70s. Thus, the data are likely to reflect a broad range of Speech-in-Noise skills as well as performance associated with different CAP categories.

We are eager to relate the home and classroom behavior with test performance. Here is just our first glance at the totals. The school personnel ranked the children in their academic achievement. We used the criterion of one-year or more behind their normal peers as a significant deficit. Table 5 shows the number with significant academic deficits

ACADEMIC DEFICITS IN SUBJECT SAMPLE

SCHOOL SUBJECTS	# SIGNIF
READING	
COMPREHENSION	11
WORD ACCURACY	9
PHONICS	8
SPELLING	9
LANGUAGE	
RECEPTIVE	6
EXPRESSIVE	5

Table 5. Significant deficits for the 23 subjects in various academic areas, as rated by their teachers. A one-year lag was considered significant.

As expected, the delay in reading was the most frequently noted. Language was rated as significant in fewer children. While it is far too early to say, this might reflect on the argument of language problems vs. CAP problems. It is our thinking that the poor decoders are more likely to have major language deficits than the Tolerance-Fading Memory cases.

Summary

This is the first installment of a study dealing with auditory processing difficulties in learning disabled children and the classroom and home behaviors that we hope will relate to our findings. We have complete data for 23 subjects.

Thus far, the data appear to reflect a broad sample of LD children. Because of the small sample we have only looked at some mean scores and percentages across the entire group.

Of the 3 tests studied, the SSW and the Speech-in-Noise tests appear to have the greatest numbers of failures. However, across the battery of tests we hope to have not only a high hit rate but considerable specificity as well. The results should help us to validate underlying CAP categories.