SSW REPORTS

VOL. 7 NO. 2 ★ RELIABILITY ★ MAY 1985

SSW Test-Retest Reliability in Learning Disabled Children

Jack Katz
Janet M. Schultz

The present study deals with test-retest relationships on the SSW test for a group of 15 LD children. A previous study by Turner (1965) revealed that in 24 normal achieving children, 9-11 years of age, that the test and immediate retest correlation, using two different forms of the SSW ED List, showed a correlation of .80 (<.01 level of confidence). The mean number of errors was quite similar, going from a mean of 15.6 to a mean of 14.2. Because these results are for 1) a restricted age range, 2) normal children, and 3) two different forms of a test, they are very impressive. When studying a succeeding age group, 12-59 years of age, for a group of 32 normal individuals, the test-retest correlation was .923 (significant at <.01). The mean scores on test and retest for this population were almost identical (7.56 errors vs. 7.59).

The present study is a retrospective report for a group of children who served as control subjects as part of a drug study (the children in this group were given only a placebo). The records for 2 girls and 13 boys, ages 7-11 years of age, were analyzed. Correlations for the RE R-SSW were .86 for the RE score, and .85 for the LE score, both of which are significant at the .01 level. When the scores for both ears were combined, the correlation increased to .91. This indicates a very strong positive relationship between initial scores on the test, and follow up testing two months later. The children showed a relatively small reduction in errors (from a mean of 14 to a mean of 10).

Table 1 shows the means, standard deviations, correlations, and probability values for the R-SSW scores, and reversals. Table 2 shows similarly stong results for the C-SSW scores for these same children. Test-retest scores for reversals were not significantly correlated. That is, although the correlation was .49, this correlation did not reach the probability level of .05. This result may be due in part to the small number of reversals that were noted, and to the one child who presented a dramatic decrease in Reversals (from 27 to 0).

Table 1

	R-SSW			
	RE	LE	TOT	REV
TEST				
Mean	11.8	15.3	13.9	5.13
SD	(9.27)	(10.6)	(9.68)	(7.76
RETEST				
Mean	9.2	10.4	9.93	3.93
SD	(8.57)	(8.60)	(8.35)	(6.41
DIFF	2.6	4.9	4.0	1.2
Pearson r*				
	.86	.85	.91	.49
P-Val	.01	.01	.01	NS

* Pretest versus posttest performance.

Table 2

	C-SSW			WDS	
	RE	LE	TOT	RE	LE
TEST					
M	11.0	13.3	12.0	99.5	97.9
SD	(9.22)	(10.17)	(8.81)	(1.41)	(3.33)
RETEST					
M	7.93	8.67	8.84	98.9	98.1
SD	(8.11)	(7.87)	(7.76)	(1.83)	(2.1)
DIFF	3.1	4.6	3.2	.6	-.2
Pearson r	.79	.85	.92		
P-Val	.01	.01	.01		

* Pretest versus posttest performance.

Another approach to the determination of validity was undertaken. The results for each of the children were analyzed in terms of hit-miss ratio based on the 1985 norms. Fourteen out of the fifteen children had quantitatively abnormal scores (C-SSW). On retest, five of those subjects obtained scores that were within normal limits. The hit-miss ration was ten versus five, with no children demonstrating a reverse trend from negative to positive. With reference to the qualitative indicators (Reversals, Ear Effect, Order Effect, and Type A), Table 3 provides the hit-miss ratio for the 15 LD children. Performance remained constant (either normal or abnormal for twelve children, but changed for three). It is worthwile to point out that in none of the three cases was the diagnosis changed because of the inconsistency in response bias. In each case, there was quantitative abnormality despite the case of qualitative abnormality.

Table 3

		Test 2	
		Pos.	Neg.
Test 1	Positive	4	1
	Negative	3	8

These results show that for the group of LD children that was studied, interpretation of the SSW remained constant when both quantitative and qualitative factors were taken into account. In two cases, in which the quantitative scores were marginally depressed, the retest performance two months later was found to be within normal limits. In the two other cases, more substantial changes took place, altering two conditions for one child, and all four conditions for the other child.

* * * * * * * * * * * * * *

A Measure of Test-Retest Reliability of the SSW

William G. Beck, M.A.
H. Gustav Mueller, Ph.D.
Roy K. Sedge, Ph.D.

Army Audiology and Speech Center
Walter Reed Army Medical Center
Washington, D.C.

Neuroaudiological tests are often used as screening tools. These tests frequently serve as a basis to order more expensive and possibly invasive radiological procedures. Acceptable test reliability is therefore a critical prerequisite to these auditory measures. Test-retest information is particularly important for speech tests, since the instability of most speech materials introduces additional performance variability. It is possible that the variability of these measures of speech recognition would cause performance changes similar in size to those produced by an auditory lesion. This could have the undesirable outcome of allowing normals to appear impaired and impaired individuals to appear normal.

When higher level auditory processing disorders are evaluated, perhaps the most commonly used test is the SSW. The SSW has been shown to have high test-retest reliability when administered to normals. Because the SSW is a relatively easy dichotic task, however, normals usually score at or near 100% and therefore, this high reliability cannot be directly generalized to individuals with auditory processing dysfunction.

During the past four years, as part of the Vietnam Head Injury Study, we have administered the SSW to more than 400 brain-injured individuals. In this report, we present the results of 29 consecutive patients demonstrating auditory processing difficulties on whom test and retest results with the SSW are available. For the test and retest, the SSW List EC was administered according to published protocol. The retest normally was conducted one to two hours after the initial examination, although in some instances, the retest was administered the next day. The SSW Right Competing (RC) and Left Competing (LC) percent correct scores, error totals for each Ear Effect and Order Effect, as well as total number of reversals were recorded for each test presentation. Previous analyses of the data for these subjects have shown that the non-competing scores and the corrected scores added little, if any information concerning the auditory pathology, and therefore, these scores were not included in the analysis.

The SSW test-retest results for RC and LC conditions are displayed in Table 1. As expected for this group of subjects with temporal lobe injury, group LC performance falls below the mean RC scores for both test and retest conditions. Observe that little group mean change occurred on retest for the RC condition. A high test-retest correlation coefficient was obtained for this condition (r=+.94) and the test-retest mean scores were not significantly different (t=1.54, p>.05). A more substantial change, however, was observed on retest for the LC condition. The 7.4% group LC improvement observed for test #2 was significant at the .05 level (t= 4.6), although the test-retest correlation coefficient was relatively high. (r=+.86).

Table 1. Summary of SSW test-retest results for RC and LC (percent correct) mean scores (X), standard deviations (S.D.) and standard errors (S.E.).

	X	S.D.	S.E.
RIGHT COMPETING (RC) SCORE			
Test #1	81.3	22.9	4.1
Test #2	83.6	20.8	3.9
Left Competing (LC) SCORE			
Test #1	68.4	15.7	2.9
Test #2	75.8	17.1	3.2

As mentioned earlier, when a speec test is used in a neuroaudiologic bat tery, individual variance becomes mor important than group mean data or cor relation coefficients, which may obscur test variance. Certainly, difference considered significant of a change i auditory processing ability must be larger than the differences observed o retest. In this regard, Figure 1 presents a distribution of the RC and L performance changes from Test 1 to Tes 2. The mean absolute test-retest difference score was 5.5% for the RC condition and 8.9% for the LC. As suggested by the mean scores, the majorit of subjects showed an improved score fo Test 2. Of particular importance, however, is the finding that 38% of the subjects demonstrated a change of 10% o greater in their LC score. Overall, RC scores followed a more normal distribution pattern, with over one-half of the subjects demonstrating less than a 5% change in scores.

In addition to performance for the RC and LC conditions, some evidence exists that suggests calculation of the response bias of the SSW (Ear Effect, Order Effect, and reversals) also is helpful in the identification and differentiation of auditory pathologies. A discussion of the test-retest repeatibility of these calculations therefore appears warranted. Table 2 summarizes the significant Ear Effects, Order Effects, and reversals observed for the two tests. In agreement with previous re-sults reported for this type of population, the majority of Ear Effects were LEF>REF and most Order Effects were 1st>2nd. More significant Effects, Ear and Order, occured in Test 1. Observe, however, that less than 50% of the same subjects demonstrated significant effects for both Test 1 and Test 2. For many subjects, the shift in categorization was a result of a small change in errors above or below the five error difference score used to establish significance. On the other hand, for some subjects significant effects changed to the extent that a greater number of errors were observed for the opposite condition (e.g. REF instead of LEF). Moreover, if these results of Ear Effects and Order Effects were used to form clinical impressions regarding the anatomical site of auditory dysfunction, this impression would have changed for 16 (55%) of the 29 patients on retest.

Because there does not appear to be strict cutoff for "significant" rever- ıls, we analyzed our data using both a 3 and >5 criterion. Regardless of :iterion, the majority of subjects did ɔt change categorization for reversals ı retest. Four subjects, however, ıowed a decrease in reversals of five r more and five subjects demonstrated ı increase of five or more.

In summary, these findings lead us ɔ make the following conclusions and ecommendations:

Group retest for the RC and LC ɪrtions of the SSW shows relatively gh correlation coefficients, although gnificant improvement for the LC ndition on retest was observed.

2) Individual data reveal that changes of 10% or greater, especially for the LC Condition, occur frequently on retest, and cannot reliably be considered a change in auditory processing ability.

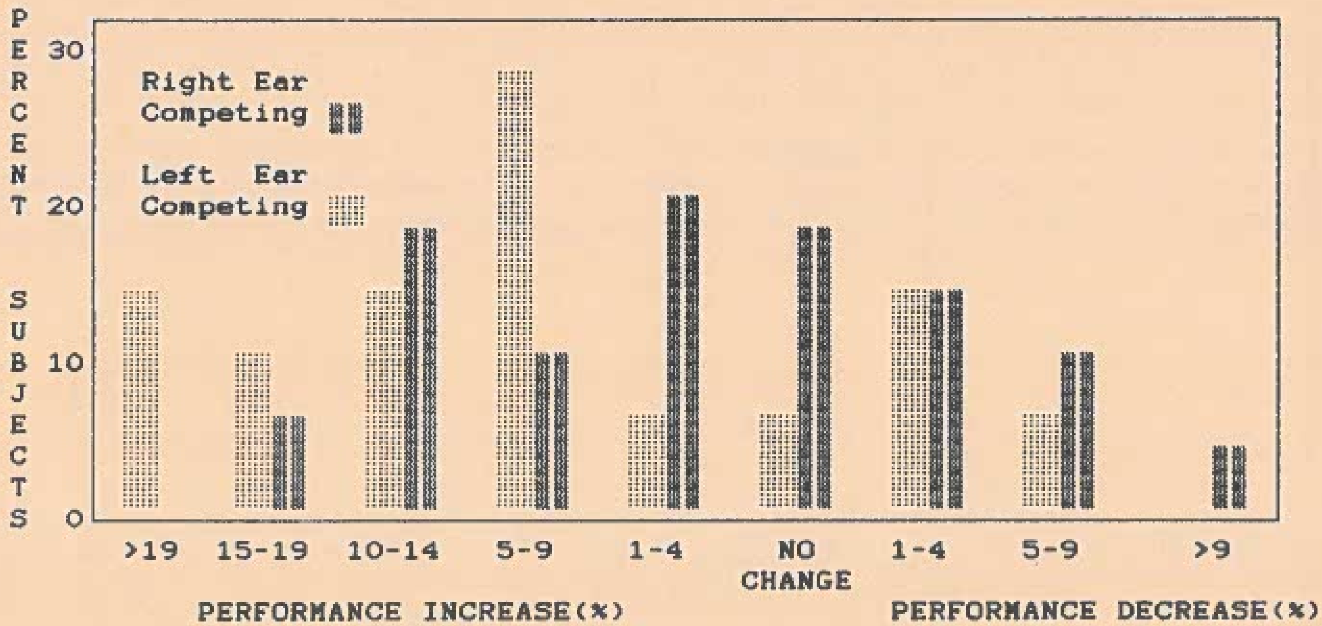
3) More than 50% of the subjects changed their response bias categorization on retest, suggesting that this information, at best, should be interpreted cautiously.

Editor's note: This is an important study of reliability because it shows test-retest scores in a stable brain damaged population. It suggests to me that more effective auditory processing can be achieved with practice. (See Minetti and McCarthy, 1978, JAR 19, pps. 263-268).

able 2. Distribution showing the number of subjects demonstrating ignificant response bias effects for Test#1 and Test#2.

	SIGNIFICANT EAR EFFECTS		SIGNIFICANT ORDER EFFECTS		SIGNIFICANT REVERSALS	
	REF>LEF	LEF>REF	1st>2nd	2nd>1st	≥3	≥5
EST#1	2	8	15	2	20	11
EST#2	1	7	10	4	14	11
EST#1 & TEST#2	0	5	8	2	13	7

Figure 1. Distribution of SSW RC and LC changes on retest.



Split-Half Reliability on the SSW EC List with LD Children

Jack Katz
Daniel Cummings

The records for 60 children who were referred because of learning disabilities were analyzed. Each age group (7-11 years) was comprised of 15 children. The performance on the first half of the test was compared to performance on the second half of the test for both total number of errors, and total number of reversals. The mean performance on the two halves of the test are shown in Table 1. It can be seen that the total number of errors was similar on both halves of the test for each age group. When considering all 60 children, the means were identical. The correlation between the two halves for the R-SSW total score was .89. This correlation is slighlty below that found in a study by Katz and Arndt (1974) using adults who had a variety of CNS or peripheral disorders. The reversals on the two halves of the test were also compared. The data show a greater degree of difference between the two halves than for the number of errors. Although the total number of reversals was small, there was a definite tendency toward more reversals on the sécond half of the test. The correlation between the two halves for reversals was .76. This correlation is consistent with the results of Katz and Arndt in their split half study with an adult population. That study showed a correlation of .79, with an average of one additional reversal on the second half of the test.

As in the work of Arndt and Katz, the split half reliability did not appear strong in these LD children. 47 of the 60 subjects were properly classified by the first half of the test for Ear Effects. 46 cases were correctly identified for Order Effect. This indicates that 13 children did not show the same Ear Effect and 14 did not show the same Order Effect on the second half of the test. Further research should consider the reason for the lack of greater correspondence.

SSW REPORTS
Jack Katz, Editor
4226 Ridge Lea Road
Amherst, NY 14226

Table 1

	Number of Errors		Number of Reversals	
Yr.	1st Half	2nd Half	1st Half	2nd Half
7	17.6	18.2	2.00	2.20
8	15.1	14.6	1.20	2.60
9	8.8	8.9	.93	1.73
10	8.7	8.4	2.13	3.80
Mean	12.53	12.52	1.56	2.57