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STILL MORE ON LD AND SSW

Robert Lukas

Much has been written on the performance of learning disabled children on the SSW test. The recent publication of the National Sample (Katz et. al.,1981) allows analysis of results of a population of LD children in a new light. Also of interest are the results of very young and adolescent subjects.

The present report looks at the results of 153 children, aged 5-15 seen over a 3½ year period in a learning disabilities diagnostic center. These children were referred primarily for multidisciplinary evaluation of academic difficulties and to a lesser degree, "purely" emotional and behavorial problems. With the exception of a small number of the latter, virtually all referrals were seen for peripheral and central auditory evaluation. All children, if capable, received an SSW test. Most were also administered other central tests, including CES, Willeford Battery, and the Pitch Pattern Sequence Test.

The children were predominantly from middle class surburban environments, mostly Caucasian, with some Black, Hispanic, and other ethnic groups represented. All were native English speakers, although a small number had bilingual Spanish or non-American English speaking backgrounds.

There were no sensory-neural hearing losses. There are two cases with unilateral conductive hearing loss which were not excluded. The population was 73% male and 27% female.

METHODS

For each age group, means and standard deviations for the four SSW conditions, and mean ear and total scores were computed. The number and percentage of ear and order effects,reversals, and Type A&B patterns were compiled. Significance was based on National Sample means and SD's (Katz,1981,1982) for ages 5-11, adult norms for 12 and over.

Total Bias Scores (TBS) were computed for each subject and the mean group TBS for each age was derived. The TBS is comprised of the number of reversals plus ear and order effect ratio differences for each case and may be seen as a quantification of "botched upedness" of a patient or group. (Katz, 1982) To this date, TBS's have not been published for the National Sample, but there may be some value to examining the tendency of TBS values with increasing age of this LD population.

Ear and order effects from cases with significant Type A or B patterns were not considered to be significant. (Katz, 1979)

To assess individual performance relative to the "universal population" of normal children, z scores based on National Sample RC and LC means and sd's were calculated.

(LD continued)

RESULTS

Results are illustrated in table 1. The systematic decrease in errors with increasing age is evident. t tests were performed to determine differences between National Sample and this group's means for RC and LC for ages 7-11. LC means were significantly poorer for the LD group. (p.01) RC means for 8 and 10 year olds were similarly significant. RC means for 7 and 9 year olds were significantly poorer than normals at p. 05. The 10 year old mean RC for the LDs was not significantly different from the National Sample's.

There was overlap of normal and LD distributions for all RC and LC conditions and age groups. To some degree this is to be expected for all valid measures as a small number of false +'s is the price paid to maximize "correct hits". However, it is important to remember that SSW score is not the only indicator of function on the SSW test. Response bias tells us at least as much about children's performance as percent error.

To illustrate this, z scores were examined for all children between the ages of 7-11. If both RC and LC scores for a child were within two sd of the normal population mean (i.e. normal), individual response bias was examined.

Of the 29 7 year olds, 13 (44.8%) had both RC and LC scores within 2 sd of the normal mean. Of these, only 6 (20.7%) did not have significant ear or order effects and/or reversals. Of these 6, 2 had what would have been Type A patterns under previous norms. (difference score = 3)

Of 28 8 year olds, 12 (42.8%) had bilaterally normal scores. 7 of these (25%) had no response bias. 20 of 28 nine year olds (71%) had normal scores but only 7 (25%) yielded no significant response bias. 11 of 21 (52%) ten year olds scored within 2 sd with 10 of 21 ten year olds yielding unbiased scores. Among the sample of 11 year olds (N=8), one yielded normal and "unbiased" results. He had abnormalities on other central auditory measures.

The steady improvement in SSW scores with increasing age is in contrast with increasing proportions of age groups 5-9 showing reversals. This might be explained by the greater chance of having no more than one error on an item as age increases. Interestingly, the percentage of subjects with significant reversals levels off above age 9 in these LD children (note small sizes above age 10).

Total Bias Score is an absolute measure, meaning age and significance or response bias are not taken into account in its computation. Thus a subject with 2 reversals, or order effect difference of 4, or an ear effect in the presence of Type A pattern is included. A slight improving trend is seen with increasing age, but between ages 5 and 12, the differences between the largest and smallest score is only 3.4 units.

Examining response bias of the entire sample without regard to age yielded some interesting results. There was a clear predominance of "anterior" bias supporting a view of auditory LD as an abnormal development of "newer" areas of the brain.

There was not one case in any age with a significant ear effect High/Low. 10 of 153 (6.5%) had order

	AGE								
	5	6	7	8	9	10	11	12	OVER 12
N	6	23	29	28	28	21	8	3	7
MEAN RNC	23.67	5.2	3.14	3.84	.14	0	1.5	-3.16	.29
SD	19.45	8.44	6.55	6.74	4.99	4.32	3.29	4.48	2.28
MEAN RC	46.17	25.09	19.69	17.95	10.32	6.66	8.06	1.00	6.00
SD	17.88	14.02	15.62	17.02	9.83	8.41	5.07	2.94	5.51
MEAN LC	53.17	40.93	34.84	29.20	20.62	22.19	19.38	9.33	13.14
SD	14.06	16.17	14.21	12.60	10.62	16.73	14.57	2.90	7.65
MEAN LNC	19.42	8.22	6.31	4.11	1.61	1.83	1.25	-1.5	-2.58
SD	14.16	11.81	7.37	4.96	5.90	4.94	5.01	4.02	3.53
RIGHT EAR	34.92	15.14	11.41	10.89	5.23	3.33	4.78	1.08	3.14
LEFT EAR	36.29	24.58	20.58	16.65	11.12	12.01	10.31	3.91	5.29
TOTAL	35.60	19.86	16.00	13.77	8.17	7.67	7.55	1.42	4.21
# EAR L/H	2	4	3	3	1	2	0	1	0
# EAR H/L	0	0	0	0	0	0	0	0	0
# ORDER L/H	1	1	3	0	4	1	0	0	0
# ORDER H/L	2	2	6	4	1	1	0	0	0
# WITH REV	0	5	8	10	11	7	3	1	3
% WITH REV	0	21.74	27.59	35.71	39.29	33.33	37.50	33.33	42.86
MEAN SIG REV	0	15	12.13	14.90	15.91	13.71	17	17	9.33
# WITH TYPE A	0	4	5	6	1	1	3	0	1
% WITH TYPE A	0	17.39	17.24	21.43	3.57	4.76	37.5	0	14.29
MEAN TBS	16.33	16.26	15.66	17.07	14.39	13.71	13.63	15.33	9.71

TABLE 1. LD GROUP DATA

(LD continued)

effects Low/High. 16 cases had ear L/H (10.5%) and 16 had order H/L (10.5%). All 21 cases had Type A patterns (13.7%). All but one was Type A-LC. There were no Type B patterns. These results seem to be in contrast with previous reports of a higher incidence of Type A-RC.

Finally, 48 cases (31.37%) had a significant number of reversals, consistent with earlier studies (Stubblefield and Young, 1975; White, 1977) demonstrating reversals to be an important indicator of central auditory dysfunction in children.

CONCLUSIONS

These results demonstrate that employing the norms developed from the SSW National Sample, both for SSW score and response bias, a high proportion of LD children with significant central auditory dysfunction are identified. This is especially true in younger children. (through 8 years old). 50% of the 114 7-11 year olds scored within 2 sd of the normal population mean contrasted with the theoretical 98%.Of these 46% had significant response bias. 73% of the 7-11 year old LD's performed abnormally on the SSW test. It must be remembered that the subjects comprising this sample were not chosen on the assumption that they had central auditory dysfuntion, but for the most part, were tested routinely from a generalized population of "learning disabled" children. It is clearly seen that if researchers and clinicians look only at SSW condition scores, while ignoring response bias in learning disabled children, a great deal of diagnostic information is being discarded.

Anyone interested in organizing a basic SSW Workshop may contact Bob Lukas Speech and Hearing Department, Helen Hayes Hospital, West Haverstraw, New York, 10993.

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HOW IT WAS DONE
Robert Lukas

Computation of results for LD children and other disability groups was performed with a microcomputer. Random access files on floppy disc were created for each group,containing age, WDS, 8 CN, and reversals of each case. A program performed all calculations including significance of response bias and computed group means, sd's, 5's, etc. Any statistic desired can be performed on individuals and groups. a correlation program has also been developed for comparison with other test measures or characteristics.

Any clinician or researcher with access to such a computer either at home or professionally who collects SSW cases can add to files and keep running records. BASIC language was employed. Table 2 is a sample of a computer printout in completely organized form.

SPINA BIFIDA
N= 12
MEAN AGE= 17.25

CSSW SCORES

	RHC	RC	LC	LHC
MEAN	1.66667	11.25	9.70833	.333333
SD	5.48689	14.3999	8.98484	4.3748
VAR	30.0972	207.354	80.7274	19.1389

RE= 6.45833 LE= 5.82083

TOTAL CSSW= 5.73958

	EAR EFFECTS L/H	H/L		ORDER EFFECTS L/H	H/L	
SIG	1	1		0	5	
PCT SIG	8.33333		8.33333	0		41.6667
NON-SIG	10			7		

REVERSALS

# WITH REV	9
% WITH REV	75
MEAN SIG REV	12.8889
SD	4.72451

TYPE A&B PATTERNS

# WITH TYPE A LC	0
% WITH TYPE A LC	0
# WITH TYPE A RC	1
% WITH TYPE A RC	8.33333
# WITH TYPE B LC	0
% WITH TYPE B LC	0
# WITH TYPE B RC	0
% WITH TYPE B RC	0

TOTAL A&B PATTERNS

# WITH PATTERN	1
% WITH PATTERN	8.33333

MEAN TOTAL BIAS SCORE= 18.4167

Table 2. Spina Bifida Data

Spina Bifida, Hydrocephalus and SSW: A Dilemma — Robert Lukas

Spina Bifida (meningomyelocele) is a congenital neural tube defect associated with almost 100% incidence of hydrocephalus. Most affected individuals are treated with one or more shunts to reduce intellectual, perceptual and physical impairments. Nonetheless, there is a high incidence of mental retardation, visual perceptual and motor problems. There is a high incidence of left handedness in this population.

Hydrocephalus primarily affects periventricular white matter, with relative sparing of cortical tissue. Given the above information, one might expect to see positive SSW results.

A sample of 12 adult patients with spina bifida were tested on the SSW. Patients with peripheral hearing problems were excluded. There were 4 cases with normal intelligence Results are seen in Table 2.

As a group, SSW was mildly depressed. There was a striking 75% incidence of reversals, with a mean number of 13. There were no AR cases and no apparent C.C. cases. Most RB was "anterior". 5 of the 6 cases with + SSW/CES comparisons indicated left Hemisphere.

2 cases were not shunted. One yielded normal results, the other had a Mo C-SSW,MiA-SSW,13 reversals,Type A-RC,0 24/8,E 21/11.

There does not seem to be one "standard" anatomical location for shunt insertion. The dilemma? Are we looking at the effects of hydrocephalus, or the physical effect of the shunt? Hard to say without unshunted hydrocephalus controls. Implications? Regardless of the cause, there is a high indicence of auditory processing disorders in this population. Moral? When interpreting results of a patient who has been shunted, interpret and report with care.

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West Haverstraw, New York, was
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*** Recently, Richard Saul (Southern Illinois University, Carbondale, Ill.) and Robert Lukas (Helen Hayes Hospital, West Haverstraw, NY) took a grueling five-day SSW Instructors Course. They both passed with flying colors (knowledge, scoring, interpretation and teaching). They are both highly qualified to offer Basic SSW Workshops. ***