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ABSTRACT

The investigation had two objectives: (1) to determine whether teachers of select deaf students can identify those considered to be unofficial candidates for dual diagnosis as deaf and learning disabled; (2) to identify which academic achievement areas, if any, would provide support for informal observations of learning disabled functioning. Subjects were 12 fourth- and fifth-grade males at a residential school for the deaf, six of whom had been identified as potentially learning disabled. The other six students were considered to be achieving normally. All students were administered the Slosson Oral Reading Test and three subtests of the American School Achievement Tests (Intermediate Battery). Results indicated that all but one of the deaf students predicted by teachers to be in the learning disabled group had similar characteristics. All of the non-learning disabled students were correctly classified. Spelling and arithmetic computation were the two variables that provided the greatest support for the observed classroom differences reported by teachers. Twenty references are provided. (JW)

VALIDATING TEACHER SUSPECTED DUAL DIAGNOSIS AMONG SELECT DEAF STUDENTS ALSO THOUGHT TO BE LEARNING DISABLED

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ABSTRACT

The investigators had two purposes for designing and implementing this study. Can teachers of select deaf students identify those young persons in their fourth and fifth grade classrooms thought to be unofficial candidates for dual diagnosis and would investigators with no prior knowledge of the students be able to accurately identify these children through the administration of the Slosson Oral Reading Test and the American School Achievement Tests Intermediate Battery. The other purpose of the study was to determine which academic achievement areas, if any, would provide support for the classroom teachers' informal observations that some deaf children (n = 6) may also be functioning like learning disabled students (n = 6). Subjects were matched for grade, level of hearing loss and measured intelligence. All were male. The prediction of group membership by the teachers was highly accurate. All but one of the deaf students predicted by the teachers to be in the learning disabled groups had similar characteristics. All of the deaf non-learning disabled students should have been classified as they were. Spelling and arithmetic computation, skills thought to be more visually dependent, were extremely important in determining differences between the two groups. The Mahalanobis' D^2 was used to direct the progression of the stepwise process and was used in evaluating the set of predictors' ability to discriminate. Had the authors been satisfied with running separate Univariate F's, at least one variable (sentence

and word meaning) would have contributed to a Type I error. More research needs to be initiated in order to further delineate the differences between deaf students and those also thought to be learning disabled as well. Whether dual diagnosis leads to better services remains to be seen.

Abstract here

It has been suggested we need constant reminders that among deaf children each specified additional handicap tends to exert a unique degree of negative influence on classroom performance and achievement (Jensema, 1975; Rogers, 1978; Rogers & Clarke, 1980). While there seems to be an ever growing interest in dual diagnosis for other special education populations (Menolascino & McCann, 1983; Menolascino & Stark, 1984) the Association for Children and Adults With Learning Disabilities in their recently adopted definition (ACLD, 1983) continue to exclude those who do not have "adequate sensory and motor systems" thus, ruling out the possibility of dual diagnosis for sensory impaired children. Commenting on a similarly worded exclusionary clause found in the Federal definition for learning disabilities, Sabatino (1983) suggests that the issue may be to use learning disabilities at least as a primary and secondary condition for sensory impaired children. His words are worth repeating:

> In short, according to the Federal definition, there are no visually or hearing sensory impaired learning disabled children in the world--the idiocy of such a rule denies the evidence that frequently the pathology or etiology resulting in sensory impairment also destroys neurons--in which case the concept "brain damage" is much superior to the term "learning disability": Yes, there are those hearing-impaired and vision-impaired kids who also have brain damage, and in the current

operational sense may qualify better than any others, and have greater need of services (p. 26).

Certainly there are many deaf children for whom deficit auditory acuity may be a necessary but not sufficient explanation for their lack of academic achievement despite an average or better cognitive potential (Hawkins-Shepard, 1977). Furthermore, others have estimated (Schein & Delk, 1974) that as many as 40% of all school aged hearing impaired children might also be learning disabled. However, the problems of identifying these children remains. Because the importance of teacher observations in the identification of learning disabled students within a deaf population has yet to be established, requiring further investigation, the authors had two purposes for designing and implementing this study. The first was a very practical one.

Can teachers of deaf students utilizing their informal observations identify those young persons in their classrooms thought to be unofficial candidates for dual diagnosis and would investigators with no prior knowledge of the students be able to accurately identify these children through formal achievement testing and sort them out from their matched classroom peers? By attempting to confirm through formal achievement testing what teachers believe they know from direct classroom obse. tion and instruction the investigators also are attempting to further legitimize and encourage the assessment of children as learning disabled based on their present repertoire of behaviors as suggested by Epps, Ysseldyke and McGue (1984) as opposed to simply relying on test results and more statistically based approaches to confirming children's special needs (Reynolds, 1984; Willson & Reynolds, 1984; and Boodoo, 1984).

While this may be muddying the waters, it should come as no surprise that teachers of the deaf with their training in and understanding of learning styles and language might wonder whether there is more to the problems that many otherwise bright, hearing impaired children experience with academic achievement than can be accounted for by the diagnosis of deafness alone. This seems particularly so when there is a discrepancy between the achievement and potential of children with the same diagnosis attending the same classes and receiving the same instruction with varying degrees of success. It is beyond the scope of this article to contribute to the debate over who is and who is not learning disabled, per se (Ysseldyke & Algozzine, 1983). It would be enough to confirm or not confirm observations of teachers struck by the realization that the children in their classrooms do not seem to neatly fit established definitions and rigidly imposed diagnostic categories.

A second major purpose for the study was concerned with which academic achievement areas, if any, on the reading test and test battery administered would provide suport for the classroom teachers' informal observations that some deaf children may also be functioning like learning disabled students.

METHOD

Subjects

Twelve fourth and fifth grade children enrolled at a mid-western residential school for the deaf composed the sample for the study. Six of the children had been identified by their teachers as potentially learning disabled. These six children were matched with six of their classmates considered to be normally achieving for the variables of grade, level of hearing loss and average or better intelligence by the school administrator. All of the subjects were male. The mean age of both groups was 11 years 5 months. The students ranged in age from 10 years 7 months to 12 years 4 months and had aided hearing losses ranging from moderate to profound. Among the group of deaf children thought to be normally achieving the unaided audiometric data indicated a mean dB threshold of 106(R)/98(L). For the deaf children thought to also be learning disabled the audiometric data indicated a mean of dB threshold of 84(R)/84(L).

Measures and Procedures

All subjects were administered the Slosson Oral Reading Test (Slosson, 1985) and three subtests of the American School Achievement Tests Intermediate Battery (Pratt, Stouffer & Yanuzzi, 1984) including sentence and word meaning, spelling, and arithmetic computation. These types of standardized tests continue to be the major research and evaluation instrument of the deaf (Ewolt, 1981). All subjects were observed for total time on task. Also each child completed a Me-Myself Semantic Differential (Osgood, 1969). Directions for all of the activities were simultaneously communicated to each subject during individual assessment. One of the investigators, a former classroom teacher of deaf students, signed interpreted and recorded each child's signed as well as orally communicated response. The investigators had no prior knowledge of the subjects and each was sent for individual assessment in a random order by the principal. The matched pairs of subjects were identified for the investigators following data analysis.

In order to evaluate the data in terms of the two primary research questions asked, an SPSS CANONICAL DISCRIMINANT ANALYSIS PROGRAM was used (Nie, et al., 1975). Since the Multiple Discriminant Analysis is a descriptive statistic, a Multi-Variate Analysis of variance was then calculated, as is the suggested procedure (Tabachnick & Fidell, 1983).

FINDINGS AND CONCLUSIONS

Perusal of data in Table 1 would lead one to conclude that there are indeed differences between the suspected learning disabled and the non-learning disabled on many of the variables. Because of the nature of the variables and the uniqueness of both groups, a stepwise approach was used. The Univariate F/F - to Enter found in Table 2 would indicate that three variables (spelling, sentence and word meaning, and arithmetic computation) were extremely important in determining differences between the two groups. The F - to Enter shows how important a variable is in predicting membership in a particular group (Tabachnick & Fidell, 1983, p. 321).

Insert Table 1 about here.

In a stepwise Discriminant Analysis, the program searches for the strongest predictor of differences between the two groups. In this study, spelling was the first variable selected (Step 1). The F - to Enter Ratios at Step 1 (see Table 2) were significantly altered as a result of the first computation (Step 1) in the stepwise Discriminant Analysis. Arithmetic computation was the next variable that was included in the Discriminant Analysis. The F - to Enter at Step 2 indicates that the remaining variables' F ratios did not reach a "significant" level (none of the F ratios reached 1.00 or above, data is not shown on tables).

After Step 2, the F level was insufficient for further computation. Consequently, the only two variables that contributed to the significant separation of the two groups were spelling and arithmetic computation (see Table 3). The Mahalanobis' D^2 was used to direct the progression of the stepwise process and was used in evaluating the set of predictors' ability to discriminate. The Mahalanobis' D^2 for spelling was 5.0031 ($p = .0031$) and for arithmetic and spelling combined, the Mahalanobis' D^2 was 5.9587 ($p = .0099$)--see Table 3. Only one Discriminant Function was generated with an Eigenvalue of 1.7876; the discriminant function had a significance level of .0099. It is evident that spelling was the major contributor to the Discriminant Function (see Standardized Canonical Discriminant Coefficients in Table 3).

A Multi-Variate Test for Significance was calculated, and the F ratios for all four tests (refer to Table 4) reached the .01 level of statistical significance. Spelling and arithmetic computation were the two dependent variables used in the MANOVA; the two variables were the only ones included because they were the two identified in the Multiple Discriminant Analysis as being discriminating predictors.

Insert Table 2, 3 and 4 about here.

The graphic illustration of the difference between the learning disabled and the non-learning disabled groups is found in Figure 1. The two groups are significantly different from each other on the one and only Significant Discriminant Function. The Multi-Variate F generated by the Canonical Discriminant Analysis is the same as the Multi-Variate F generated by the MANOVA. This, of course, is due to the fact that there are only two groups.

The prediction of group membership by the teachers was highly accurate. All but one of the deaf students, predicted by the teachers to be in the learning disabled group, had similar characteristics. All of the non-learning disabled students should have been classified as they were (refer to Table 3).

Although not reported in this paper, the authors did calculate a non-stepwise Multiple Discriminant Analysis. The Discriminant Funtion that was generated did not reach the .05 level of significance. Thus, the analysis demonstrates the value of a stepwise approach. The six variables, considered as a whole, masked the differences between the two groups, and differences would not have been identified using a non-stepwise approach. Also, had the authors been satisfied with running separate Univariate F's, at least one variable (sentence and word meaning) would have contributed to a Type I error.

Insert Figure 1 about here.

DISCUSSION

There is no question that the teachers who taught the students involved in this study were able to accurately classify them into two distinct groups, learning disabled and non-learning disabled groups. It would appear that the non-learning disabled group consistently scored higher in all of the tests given, except for the Me-Myself Semantic Differential. Although it should be noted that in the univariate space, only three variables generated significant differences i.e., spelling, sentence and word meaning, and arithmetic computation. (The Slosson Oral Reading Test approached a level of significance.) In a multi-dimensional space, just two variables were significant separators of the groups.

There is no question that spelling and arithmetic computation were the two variables that provided the greatest support for the observed classroom differences reported by teachers. Since the classroom is a multi-dimensional environment, it is important that variables be considered in conjunction with other variables and factors, rather than being treated as though they exist in a vacuum.

Given that the learning disabled group had lower test scores, one might conclude that the different styles found in the group tended to negatively influence achievement as measured by the various tests in the study. It is also quite possible that the learning disabled group has not, for whatever reason, adopted the "traditional" learning style of the hearing [illegible].

One possible explanation for the differences found is: (1) the learning disabled group has equal aural-dependent learning skills as does the non-learning disabled group, but does not have equal visual-dependent learning skills; (2) in a learning situation where both aural and visual channels are helpful, aural skills play a dominant influence even for deaf students, thus negating the visual skill advantages of the non-learning disabled group; and (3) in learning situations where subjects are primarily dependent on visual modality (and aural modality is counterproductive to learning) those with visual skills (such as those possessed by the non-learning disabled) outperform those who do not have such skills.

Spelling and arithmetic computation are both dependent on a visual modality. All other tests in this study have a greater aural dependency in the nature of the subject matter involved than does spelling or arithmetic computation. Consequently, the non-learning disabled group was significantly different than the learning disabled group in these two areas. If the differences between the two are predicated by an aural-visual dependency, then variables that are free of aural dependency would be more appropriate in making distinctions between the two groups. It might also be that the learning disabled deaf child might not have developed skills in areas that require a greater visual modality than an aural modality.

If that is the case, then spelling and arithmetic computation are good predictors of differences because both are dependent on a visual modality--a modality which is either weak or non-existent in the learning disabled child. Since all the other variables involved in this study have a greater aural dependency, these aurally oriented variables would then tend to mask the differences between the learning disabled and the non-learning disabled child.

In order to discriminate between the learning disabled and the non-learning disabled child, teachers would have to rely more on visual dependent modalities to make the distinction. This raises questions concerning the genesis of the learning differences. However, it is also quite possible that the learning disabled child has developed significant skills in other areas to overcome deficits found in this study. It is also possible that maturation and time will make up differences found in this study.

Whether the above explanation is appropriate is beyond the scope of this study. What is evident is: (1) that at least two distinct learning groups do exist within the deaf student community; (2) teachers were able to successfully identify the two groups; (3) visually oriented learning activities aided in the identification of the two groups; (4) the non-learning disabled group had significantly higher achievement scores in the visually oriented areas; and (5) more research needs to be initiated in order to further delineate the differences between learning disabled and non-learning disabled deaf students.

What remains to be seen is whether or not a dual diagnosis will lead to better educational opportunities and services for deaf children also thought to be learning disabled.

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TABLE 1

Group Means and Standard Deviations

	L.D.		Non-L.D.	
	$\bar{x}$	S.D.	$\bar{x}$	S.D.
Me-Myself (Semantic Differential)	98.333	9.114	89.167	12.922
Time-on-Task	43.395	10.724	48.228	18.428
Slosson Oral Reading (Word Calling)	56.167	16.654	72.500	12.880
Spelling (ASAT)	18.667	9.606	35.167	4.070
Sentence and Word Meaning (ASAT)	17.167	4.446	24.500	3.564
Arithmetic Computation (ASAT)	9.000	3.688	17.833	6.014

TABLE 2

Canonical Multiple Discriminant Analysis Univariate F-Ratio/ F-to Enter Summary at Step 0

Variable	Univariate F/ F-to Enter	Sig.*
Me-Myself (Semantic Differential)	2.0164	.1860
Time-on-Task	0.1416	.9076
Slosson Oral Reading (Word Calling)	3.6111	.0866
Spelling (ASAT)	15.0092	.0031
Sentence and Word Meaning (ASAT)	9.9384	.0103
Arithmetic Computation (ASAT)	9.4072	.0119
F - to Enter at Step 1		
Me-Myself (Semantic Differential)	.1705	
Time-on-Task	.6435	
Slosson Oral Reading (Word Calling)	.1821	
Sentence and Word Meaning (ASAT)	.3710	
Arithmetic Computation (ASAT)	1.0317	

*df = 1,10

TABLE 3

Canonical Multiple Discriminant Analysis Summary

Variable	Wilk's Lambda	Sig.	Minimum D Squared	Sig.
Spelling	.3999	.0031*	5.0031	.0031[a]
Arithmetic	.3587	.0099**	5.9587	.0099[b]
Discriminant Function	**Eigenvalue**	**% of Variance**	**Cum. %**	**Canonical Correlation**
1	1.7876	100	100	.8008
Test for Residual After Removing:	**x^2**	**df**	**Sig.**	
None	9.2267	2	.0099	
Standardized Canonical Discriminant Function Coefficients				
Spelling	.7474			
Arithmetic	.4348			
Prediction of Group Membership				
	Predicted			
Actual Group	**L.D.**	**Non-L.D.**		
L.D.	83.3% (5)	16.7% (1)		
Non-L.D.	0.0% (0)	100% (6)		

*df = 1.10

**df = 2.9

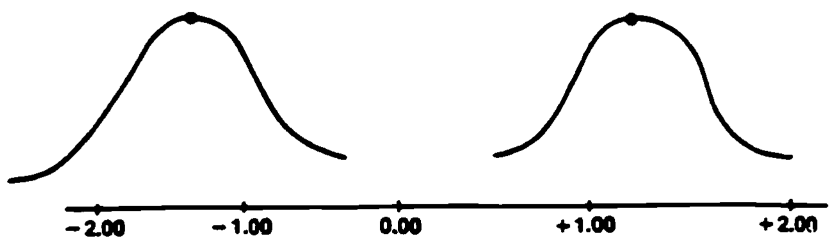
TABLE 4

Multivariate Tests of Significance Summary*

Test	Value	Approx. F	Hyp. D.F.	Error D.F.	Sign.
Pillai's	.6413	8.0443	2	9	.01
Hotelling's	1.7876	8.0443	2	9	.01
Wilk's	.3587	8.0443	2	9	.01
Roy's	.6413	8.0443	2	9	.01
Variable	**Hypo. MS**	**Error MS**	**Univariate F**		**Sig.****
Spelling	816.7500	54.4167	15.0092	24.8833	.003
Arithmetic	234.[illegible]833	24.8833	9.4072		.012

*s = 1, M = 0, N = 3½

**df = 1, 10



Centroids of Groups in Reduced Space

	Function 1
Group L.D.	− 1.2205
Group NON-L.D.	1.2205

Multivariate F Matrix df = 2, 9

	Group L.D.
Group NON-L.D.	F = 8.0443 p = .0099

Figure 1. Plot of Group Centroids