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By- Williams, Charlotte L.; Tillman, M. H.
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The effects of age and intelligence levels upon word associations were studied in 96 intellectually retarded, normal, and superior children with IQ's of 65 to 80, 91 to 110, and 117 to 158 respectively. A word association and a word usage task (reliability coefficients of .91 and .98) called for homogeneous responses to six form classes--count nouns, mass nouns, adjectives, intransitive verbs, transitive verbs, and adverbs. Results generally supported the conclusions that homogeneous responding increased in a linear fashion across age with the more frequently occurring form classes leveling off in some instances, and followed a regular sequence of development regardless of intelligence group. Performance level differed for retardates when they were compared with the superior group and, in some instances, with the normal group while performance level does not differ when normal and superior groups are compared. The rate of homogeneous responding appears to be similar for all intelligence groups on the more commonly used form classes while the groups respond differentially in some instances on the more complex form classes. (Author/JD)

WORD ASSOCIATIONS FOR SELECTED FORM CLASSES OF CHILDREN VARYING IN AGE AND INTELLIGENCE[1]

Charlotte L. Williams and M. H. Tillman

University of Georgia

ABSTRACT

Retarded (R), normal (N), and superior (S) children across four age levels were compared on homogeneous responses for six form classes on word association and word usage tasks. Results generally indicated that rate of development and sequence of development were similar; initial differences in performance levels ($R \leq N$; $R < S$; $N = S$) were maintained or, in a few instances, increased.

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WORD ASSOCIATIONS FOR SELECTED FORM CLASSES OF CHILDREN VARYING IN AGE AND INTELLIGENCE

Charlotte L. Williams and M. H. Tillman

University of Georgia

Recent studies of word associations have suggested that the developmental trend from heterogeneous to homogeneous responding is highly related to the acquisition of syntax. However, the role of intelligence in language development is less clear; the whole matter needs further exploration. The present investigation was designed to study the effects and interaction effects of selected subject characteristics on homogeneous word associations to certain form classes. The specific research objectives were: (1) to examine the role of intelligence level in children's word associations for selected form classes; and (2) to examine the role of age level in children's word associations for selected form classes.

METHOD

Subjects

Subjects were 96 intellectually retarded, normal, and superior children between the ages of four and twelve. Eight subjects were selected to fill each of the several cells of the research design. These cells were formed by the overlapping of the dimensions of the two independent variables, intellectual performance and chronological age. There were four age levels, each consisting of a two-year-age span.

Intellectual performance was assessed with the Form LM of the 1960 Revision of the Stanford-Binet Intelligence Test. Intelligence levels were defined in the following manner: retarded, 65 to 80 IQ; normal, 91 to 110 IQ; superior, 117 to 158 IQ.

Descriptive and inferential statistics portraying characteristics of the subjects grouped by IQ and CA level were obtained. These data indicate that the necessary design requirements were satisfied.

Instruments

Two tasks were employed to examine the subjects' utilization of the English parts-of-speech. These were a word association task and a word usage task.

The word association task was taken from a study by Brown and Berko (1960). In their formulation of this task, 36 high frequency stimulus words were used in such a manner that there were six words in each of the six selected parts-of-speech categories: count nouns, mass nouns, adjectives, transitive verbs, intransitive verbs, and adverbs. The syntactic distinction between count and mass nouns is as follows: count nouns in the singular can be preceded by a and in the plural by some (for example, a book, some books); mass nouns, by contrast, appear only in the singular form and may not be preceded by a (for example, some air). Verbs may be divided into transitive verbs, those which generally occur with objects, and intransitive verbs, those which occur without objects. As Brown and Berko pointed out, many English words may function as several parts-of-speech but the stimulus words which these investigators used belong primarily to one part-of-speech class.

A word usage task was modified from the version presented by Brown and Berko (1960). This modified task introduced a nonsense syllable within a syntactical context by using it in two complete sentences. These nonsense syllables were so positioned that the six form classes of interest were represented. After an oral presentation of the two

sentences, the child's task was to tell what the nonsense syllable could mean. The rationale for the usage task is this: if a child has learned to use syntactical relationships, his responses will reflect this learning. Moreover, word usage suggests a test of an internalized language structure: will a child, given a new word within a definite syntactical context, supply a meaning which is of the same form class as the new word?

The Brown and Berko (1960) instruments were adapted and pilot-tested and intra-test reliability coefficients were obtained: These reliability coefficients on the word association task ranged from .66 for mass nouns to .91 for count nouns. The reliability coefficient for the total task was .91. On the word usage task, reliability coefficients ranged from .62 on count nouns to .94 for adjectives. The reliability coefficient for the total task was .98.

Procedures

The tasks were administered individually in two sessions, generally with one week intervening between tasks. Responses, given orally, were recorded by the examiners and on tape.

RESULTS

The statistical techniques consisted of the following: the two-way classification analysis of variance (Steele and Torrie, 1960) was employed (Table 2); where IQ levels and IQ X CA interactions proved to be significant, individual *t* tests (Steele and Torrie, 1960) were used (Table 3); where chronological age levels and IQ X CA interactions were significant, trend analyses (Steele and Torrie, 1960) were done (Table 4). The criterion scores on both word association and word usage tasks were

TABLE 1

Mean Number of Homogeneous Responses For Intelligence Groups on Word Association and Word Usage Tasks

Form Class	Word Association Task Group			Word Usage Task Group		
	R	N	S	R	N	S
Count Nouns	2.93	3.78	4.25	4.00	4.68	4.78
Adjectives	1.72	2.94	3.31	2.63	3.47	4.00
Intransitive Verbs	1.59	2.59	3.34	2.00	3.09	3.72
Transitive Verbs	1.43	2.50	2.75	2.94	3.88	4.06
Adverbs	1.13	2.00	2.44	0.47	1.06	1.68
Mass Nouns	1.06	1.56	2.00	2.31	3.53	3.75

TABLE 2

Results of Two-Factor Analysis of Variance
(IQ Group X Age Group)

A. Word Association

Source of Variation	df	Mean Square					
		Count Nouns	Mass Nouns	Adjectives	Intransitive Verbs	Transitive Verbs	Adverbs
Total	95	3.41	2.31	4.56	3.77	4.64	3.09
Groups	2	14.16**	7.04*	22.22**	24.67***	15.54***	14.29***
Ages	3	18.20***	9.61**	49.31***	39.98***	73.18***	40.13***
G X A	6	3.85	1.15	2.94	0.97	4.39*	1.83
Error	84	2.59	2.02	2.66	2.18	1.95	1.60

B. Word Usage

Total	95	2.72	3.51	5.52	3.51	4.28	2.17
Groups	2	5.82	19.20***	15.39***	24.22***	11.63**	11.89***
Ages	3	19.76***	41.37***	106.45***	47.79***	59.25***	22.45***
G X A	6	2.20	0.60	3.20	2.05	2.78	2.83*
Error	84	2.07	1.99	1.84	1.54	2.25	1.17

*p of F <.05; **p of F <.01; ***p of F <.001.

TABLE 3

Results of Paired Comparisons Where Significant Differences Occurred (IQ Levels and G X A)

A. Word Association

	Form Class					
	Count Nouns	Mass Nouns	Adjective	Intransitive Verbs	Adverb	Transitive Verbs
R:N	R=N	R=N	R<N*	R<N*	R<N*	(CA 4&5) R=N (CA 6&7) R=N (CA 8&9) R=N (CA 10&11) R=N
R:S	R<S**	R<S**	R<S**	R<S***	R<S**	(CA 4&5) R=S (CA 6&7) R=S (CA 8&9) R=S (CA 10&11) R<S**
N:S	N=S	N=S	N=S	N=S	N=S	(CA 4&5) N=S (CA 6&7) N=S (CA 8&9) N=S (CA 10&11) N=S

B. Word Usage

R:N	--	R<N**	R=N	R<N*	(CA 4&5) R=N (CA 6&7) R=N (CA 8&9) R=N (CA 10&11) R<N**	R=N
R:S	--	R<S**	R<S*	R<S***	(CA 4&5) R=S (CA 6&7) R=S (CA 8&9) R<S* (CA 10&11) R<S**	R<S*
N:S	--	N=S	N=S	N=S	(CA 4&5) N=S (CA 6&7) N=S (CA 8&9) N=S (CA 10&11) N=S	N=S

*p of F <.05; **p of F <.01; ***p of F <.001.

TABLE 4

Results of Trend Analyses Where Significant Differences Occurred (Age and G X A)

A. Word Association

Form Class	Group	Mean Square Linear	Quadratic	Cubic
Count Nouns	Total	51.35***	1.26	2.00
Mass Nouns	Total	28.03***	0.67	0.13
Adjectives	Total	121.00***	21.09**	5.85
Intransitive Verbs	Total	98.10***	4.17	17.25**
	R	19.60**	0.50	9.03*
Transitive Verbs	N	75.63***	4.50	15.63**
	S	115.60***	0.50	4.90
Adverbs	Total	108.30***	6.00	6.08

B. Word Usage

Count Nouns	Total	56.72***	0.01	2.55
Mass Nouns	Total	115.05***	6.51	2.55
Adjectives	Total	296.10***	12.76*	10.50*
Intransitive Verbs	Total	140.83***	0.67	1.88
Transitive Verbs	Total	170.41***	7.04	0.30
	R	2.26	0.03	0.31
Adverbs	N	25.60***	0.00	3.03
	S	50.63***	0.00	2.50

*p of $F < .05$; **p of $F < .01$; ***p of $F < .001$.

the number of homogeneous responses to any form class. Homogeneous responses refer to those responses which are of the same grammatical class or form class as the stimulus words. Subjects made one response to each stimulus word. Form class means for the IQ groups are presented in Table 1.

Word Association

The main effects for IQ groups were significant for each form class: the superior group's mean numbers of homogeneous responses exceeded those of the retarded group on count nouns, mass nouns, adjectives, intransitive verbs, and adverbs; the normal group's means were significantly higher than those of the retarded group on adjectives, intransitive verbs, and adverbs. In only one instance, transitive verbs, was there a significant IQ X CA interaction: the oldest CA group of superior subjects performed more adequately than did the retarded, while at the younger ages, the two groups did not differ.

In all instances, the CA groups differed for each of the six form classes: for count nouns, mass nouns, adverbs, adjectives, and intransitive verbs, there were highly significant linear trends over the four age groups for numbers of homogeneous responses; however, for adjectives there was a definite quadratic trend also, portraying the leveling off of homogeneous responses at the 10 and 11 CA level, and for intransitive verbs there was a demonstrable cubic function due to the lower mean at the highest age level. For transitive verbs, where the significant interaction occurred, the IQ levels groups were examined separately: the retarded and normal groups showed linear and cubic trends, whereas the superior group continued in a linear fashion at the highest age levels.

Word Usage

With the exception of count nouns, the main effects for IQ groups were significant on each form class: the superior group's means were significantly greater than those of the retarded group on mass nouns, adjectives, intransitive verbs, and transitive verbs; the normal group's means were higher than those of the retarded group on mass nouns and intransitive verbs. On adverbs, there was a significant IQ X CA interaction: the two oldest superior groups' and the oldest normal group's means exceeded those of the retarded group, while the IQ groups did not differ at the younger ages.

The CA groups differed for every form class: for count nouns, mass nouns, intransitive verbs, transitive verbs, and adjectives there were highly significant linear trends over the four age level groups for numbers of homogeneous responses; also, there were significant quadratic and cubic trends for adjectives. For adverbs, where a significant interaction occurred, the retarded group showed no increment over age while the normal and superior groups showed strong linear trends.

SUMMARY OF RESULTS

The results of this study generally support the following conclusions:

1. Homogeneous responding increases in a linear fashion across age with the more frequently occurring form classes leveling off in some instances.

2. Homogeneous responding to form classes follows a regular sequence of development regardless of intelligence group.

3. Performance level differs for retardates when they are compared with the superior group and, in some instances, with the normal group while performance level does not differ when normal and superior groups are compared.

4. Rate of homogeneous responding appears to be similar for all intelligence groups on the more commonly used form classes while the groups respond differentially in some instances on the more complex form classes.

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