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ABSTRACT

This study probed whether or not a distinctive Down syndrome (DS) pattern could be found in the realm of vocabulary comprehension. Groups of 29 each of DS adolescents, non-DS mentally retarded (MR) adolescents, and nonretarded children were statistically matched on receptive vocabulary ability; DS and MR groups were also matched for chronological age. The DS and MR groups had mean chronological ages of 209.6 and 209.8 months, respectively. The mean chronological age of the nonretarded group was 62.6 months; the mean age equivalence scores of the two adolescent groups were 56.7 months (DS) and 57.9 months (MR). Subjects were tested on the Peabody Picture Vocabulary Test-Revised, a nonverbal test of receptive language. Multivariate analyses indicated that DS and MR groups did not differ in understanding of the words in any category and in fact showed higher levels of comprehension than the nonretarded group in two categories, implying that DS individuals do not show specific deficiencies in vocabulary comprehension. (PB)

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Vocabulary Comprehension by Down Syndrome Adolescents

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Abstract

Recent studies of Down syndrome (DS) individuals suggest that their language skills are worse than those of other mentally retarded individuals. The purpose of the present study was to determine whether a distinctive DS pattern exists in the realm of vocabulary comprehension. Twenty-nine DS adolescents, 29 non-DS mentally retarded (MR) adolescents, and 29 nonretarded (NR) children were statistically matched on receptive vocabulary ability (57 months); DS and MR groups were also matched on chronological age (210 months). Each subject's performance on the Peabody Picture Vocabulary Test-Revised (PPVTR), a non-verbal test of receptive language, was evaluated. Items on the PPVTR were assigned to one of ten conceptual categories such as action verbs, household items, or humans. Tabulations were made of the number of items each subject answered correctly in a given category. The basic question was: Do DS subjects differ from matched MR and NR subjects in their understanding of words in any of the ten categories? Preliminary analyses revealed that the three groups were well matched on potentially confounding variables such as the total number of words a subject had been presented in each category. A multivariate analysis of variance performed on the 10 dependent variables revealed that: a) the two mentally retarded groups did not differ in their understanding of words in any of the 10 categories, and b) the two mentally retarded groups showed significantly better comprehension of words in two categories (household items and vehicles) than the nonretarded group. It was speculated that the latter result was due to the cumulative experiences or special educational opportunities possessed by the older retarded subjects. The results suggested, overall, that Down syndrome individuals do not appear to show specific deficiencies in vocabulary comprehension on the PPVTR.

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Vocabulary Comprehension by Down Syndrome Adolescents

Words are the principal means by which we communicate and think; they play a crucial role in the way we organize general factual knowledge in semantic memory (Stan & Mosley, 1988). A recent review of language development in Down syndrome (DS) individuals concluded that their language abilities tend to be worse than would be predicted from their level of cognitive development (Miller, 1987). Several studies have suggested that DS individuals also differ from matched peers (usually nonretarded children) in several specific language skills. They have been shown to display delayed (Bridges & Smith, 1984) and deficient (Hartley, 1982; 1985) comprehension of syntax, less variable syntactic expression (Wiegel-Crump, 1981), and generally poor receptive and expressive functioning (Marcell, Harvey, & Cothran, 1987).

The present study focused on vocabulary comprehension of DS individuals. Inclusion of non-DS mentally retarded (MR) subjects, as well as nonretarded (NR) subjects, permitted an evaluation of the role of low intelligence in DS vocabulary comprehension. The primary question was whether DS individuals, relative to mental-age matched MR and NR individuals, show a distinctive pattern of vocabulary comprehension.

Method

Subjects

Three groups of subjects (29 DS, 29 MR, and 29 NR) were created from a pool of students previously tested in Charleston and Berkeley County (South Carolina) schools. Test protocols for the subjects had been gathered in earlier studies conducted by Marcell, Cothran, and Harvey (1987), Marcell, Harvey, and Cothran (1988), and Marcell and Weeks (1988). The groups were statistically matched on global receptive vocabulary ability using the age equivalence index of the Peabody Picture Vocabulary Test-Revised (PPVTR; Dunn & Dunn, 1981). The mean age equivalence scores of the three groups, in months, were 56.7 (DS), 57.9 (MR), and 56.6 (NR). The DS and MR groups were also matched on chronological age (mean CAs were 209.6 and 209.8 months, respectively); the mean CA of the NR group was 62.6 months. Matching of groups was accomplished blindly (i.e., without knowledge of subjects' responses to individual items on the PPVTR).

Materials

The PPVTR is a non-verbal test of receptive language employing cards that contain four drawings representing various concepts and/or objects. The subject points to the drawing which he or she believes represents the word spoken by the examiner. For instance, the examiner may present a card containing pictures of a parrot, dolphin, frog, and cat and say the word "turkey". The subject's task is to respond by pointing to the picture which best illustrates this concept. Thus, the PPVTR assesses only comprehension skills, not speaking skills, of the subject.

Ten conceptual categories were created to classify the first 114 items of the 175-item PPVTR (no subject scored above item 114). The categories (action verbs, descriptors, animals, plants, humans, manufactured products, household items, vehicles, social relationships, and mathematical concepts) were based on the 19 original categories used to classify items in the initial development of the PPVTR. The number of categories was reduced to 10 by combining closely-related categories (e.g., the original PPVTR categories of food, plants and produce were combined to create a new category, plants) and creating one new category (social relationships). Of the 114

vocabulary items, only four could not be readily placed by word meaning alone. The final decision for placement of each of these four items was made on the basis of the surrounding context of the distractor pictures as well as the meaning of the word itself.

Outline of Research Procedure

1. PPVTR data were drawn from other studies conducted in 1985-1987.
2. Groups of DS, MR, and NR subjects were formed ex post facto in 1988. The three groups were blindly matched on global receptive vocabulary ability and the two mentally retarded groups on chronological age.
3. PPVTR vocabulary items were placed into the 10 categories listed earlier (action verbs, descriptors, animals, etc.).
4. Tabulations were made of the number of items answered correctly by each subject in each category. For example, if a subject completed four of the 11 items in the vehicles category and correctly identified three of them, then his or her score for the vehicles dependent variable was 3.
5. Statistical comparisons were made to determine whether groups differed in their ability to comprehend items in specific categories.

Results and Discussion

The primary analysis was a between-subjects multivariate analysis of variance performed on the 10 dependent variables: action verbs, descriptors, animals, plants, humans, manufactured items, household items, vehicles, social relationships, and math concepts. The independent variable (group membership) had three levels: DS, MR, and NR. The analysis generally revealed that: a) the two mentally retarded groups did not differ in their understanding of words in any of the 10 categories, and b) the nonretarded group showed significantly poorer comprehension of words in the household items and vehicles categories than either of the two retarded groups. The following sections summarize the preliminary analyses and details of the multivariate analysis.

1. Justification of the Dependent Variables. The score used to indicate subject performance in each word category was the total number of items answered correctly. Before using this measure, it was first necessary to confirm that potential group differences were not due to a confound (such as one group having the opportunity to answer more items in a given category than another group). Each subject's PPVTR protocol was thus initially scored for: a) the total number of words presented in each category; b) the total number of words presented between the subject's lowest basal item and highest ceiling item; and c) the item numbers of the first and last items presented. Initial analyses revealed that the three groups were well matched on each of these variables. The primary analysis, then, could be performed on the total number of items correctly answered within each category.

2. Check for Univariate Outliers. Extreme scores on the dependent variables were identified separately for each group. Data were converted to standardized (z) scores; a z score of + or -3 or higher was used to identify outlying cases. Four outlying scores (generated by four different subjects) were found among the 870 data points. In each case the extreme observation was replaced by a raw score that was equal to the next most extreme score in that distribution.

3. Check for Multivariate Assumptions. Evaluation of the assumptions of multicollinearity, singularity, and univariate homogeneity of group variances revealed no threats to multivariate analysis.

4. Multivariate Test Statistics. The combined dependent variables were significantly affected by group membership, Pillai Trace $F(20,152) = 1.724$, $p = .035$. This significant effect was replicated in the Wilks' Lambda, Hotelling-Lawley Trace, and Theta F statistics.

5. Discriminant Functions. Two discriminant functions (i.e., new variates or response dimensions) based on independent linear combinations of dependent variables were calculated. Only the first function was significant, Bartlett's $\chi^2(20) = 34.371$, $p = .024$. Inspection of the loading matrix of correlations between the significant discriminant function and the dependent variables suggested that the new variate was defined primarily by household items (canonical loading = -0.516) and secondarily by vehicles (-0.343). [Only loadings of + or -.30 or higher were considered eligible for interpretation (Tabachnick & Fidell, 1983).]

6. Mean Performances of Groups. The NR group comprehended fewer household items (mean = 3.8) than either the DS ($M = 5.0$) or MR ($M = 5.4$) groups. Likewise, the NR group comprehended fewer items in the vehicles category ($M = 1.9$) than either the DS ($M = 2.5$) or MR ($M = 2.8$) groups.

7. Summary. Overall, the results suggested few important differences among the three groups in patterns of vocabulary comprehension on the PPVTR. The only statistically significant difference was one in which the two groups of mentally retarded adolescents showed better comprehension of words in the household items (e.g., "vase", "frame", "capsule") and vehicles (e.g., "sail", "helicopter", "pedal") categories than the younger nonretarded children. It is unlikely that this statistical advantage represents a practically important difference; it may simply represent greater exposure to a variety of experiences with age (Ronjal, 1978) or the effects of specialized language intervention and special education (Miller, 1987). There was no support for Miller's (1987) suggestion that conceptually complex or abstract ideas may be difficult for DS individuals to learn. There was also no support for Shipe, Cromwell, & Dunn's (1966) conclusion that mentally retarded subjects in general have more difficulty understanding words with human than nonhuman content. The results suggested that on the PPVTR, Down syndrome individuals who are matched to other retarded and nonretarded individuals on global receptive vocabulary ability do not show specific deficiencies in the kinds of words they comprehend.

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