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ABSTRACT

This study explored two aspects of language expression (defining words and repeating sentences) in samples of 26 Downs Syndrome (DS) and 26 mentally handicapped (MH) adolescents and young adults matched on intelligence and chronological age. Testing included language tests, a comprehensive audiological assessment, and computer-based memory experiments. Multiple partial correlations (with the effects of intelligence quotient and chronological age statistically removed) suggested that, for both groups: (1) oral vocabulary and sentence imitation abilities were unrelated; (2) sentence imitation accuracy and speed were negatively correlated; (3) sentence imitation correlated with auditory short-term memory and sentence comprehension; and (4) neither oral vocabulary nor sentence imitation correlated with hearing sensitivity. DS subjects who were better at defining words and repeating sentences tended to perform better on an experimental task measuring speed of word identification. The results suggest that DS and MH expressive language differences emerge most clearly in contexts requiring precise remembering and repeating of word sequences, and that part of the DS difficulty may be rooted in the speed with which individual words are processed and recalled. (29 references) (JDD)

Expressive Language in Down Syndrome and Other Trainable Mentally Handicapped Individuals

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Abstract

An important behavioral characteristic of Down syndrome (DS), in addition to mental retardation, is difficulty with expressive language. Most studies of DS expressive language, however, either fail to include a comparison group or include only a nonretarded comparison group; thus, it is unclear whether the particular language difficulty is characteristic of individuals with Down syndrome or individuals who happen to be mentally handicapped. The present study explored two aspects of language expression (defining words and repeating sentences) in samples of 26 DS and 26 MH (non-DS mentally handicapped) adolescents and young adults matched on intelligence and chronological age. Each subject spent a summer's day at the College of Charleston in an individualized program of play and testing, the latter including language tests, a comprehensive audiological assessment, and computer-based memory experiments. Subjects' responses to two expressive language subtests from the Test of Language Development-2 Primary were tape recorded. The Oral Vocabulary Subtest required subjects to define common words and the Sentence Imitation Subtest required subjects to repeat a sentence spoken by the examiner. Although the groups did not differ in the accuracy of their spoken definitions of simple words, $t(50)=1.490$, $p=.142$, DS subjects had more difficulty imitating sentences, $t(50)=3.375$, $p=.001$, and were slower to initiate their sentence imitations, $t(49)=2.048$, $p=.046$. Multiple partial correlations (with the effects of IQ and CA statistically removed) suggested that for both groups: a) oral vocabulary and sentence imitation abilities were unrelated; b) sentence imitation accuracy and speed were negatively correlated; c) sentence imitation correlated with auditory short-term memory and sentence comprehension; and d) neither oral vocabulary nor sentence imitation correlated with hearing sensitivity. Furthermore, DS subjects who were better at defining words and repeating sentences tended to perform better on an experimental task measuring speed of word identification. The results suggested that DS and MH expressive language differences emerge most clearly in contexts requiring precise remembering and repeating of word sequences, and that part of the DS difficulty may be rooted in the speed with which individual words are processed and recalled.

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Expressive Language in Down Syndrome and Other Trainable Mentally Handicapped Individuals

It is widely observed that one of the most salient behavioral characteristics of Down syndrome (DS) individuals, in addition to mental retardation, is difficulty with language (e.g., Evans, 1977; Gibson & Harris, 1988; Mahoney, Glover, & Finger, 1981; Sommers & Starkey, 1977). When language difficulties are documented, they are typically in the realm of expression [e.g., Andrews & Andrews, 1977; Cornwell, 1974; Leuder, Fraser, & Jeeves, 1981; Rogers, 1975; see Miller (1987) for a review]. Most studies of DS expressive language, however, include either no comparison group or a nonhandicapped (NH) comparison group. Because of the absence of a non-DS mentally handicapped (MH) comparison group, it is unclear whether the particular language difficulty is characteristic of individuals with Down syndrome or individuals who happen to be mentally handicapped.

The few studies that compared older DS and MH individuals on elicited language tasks suggest that expressive language difficulties are, indeed, more characteristic of mentally handicapped individuals with Down syndrome. Marcell, Harvey, and Cothran (1987) found a DS < MH < NH performance ordering on expressive language items of the Test of Early Language Development. Rondal, Lambert, and Sohier (1981) reported that DS children vocally imitated words more poorly than MH children, and Burr and Rohr (1978) observed poorer DS than MH performance on the verbal expression subtest of the Illinois Test of Psycholinguistic Abilities. The purpose of the present study was to extend the above research by exploring in greater depth two aspects of expressive language ability--defining words and repeating sentences--in matched samples of DS and MH adolescents and young adults. Subjects were also measured on language comprehension, auditory short-term memory, speed of word identification, and hearing ability in order to chart the relationship of these measures to expressive language ability.

Method

Subjects

Fifty-two subjects (26 DS and 26 MH) educationally classified as trainable mentally handicapped were recruited from eleven public schools (N=44), a residential institution (N=2), and two community programs for mentally handicapped adult citizens (N=6) in the Charleston, South Carolina, area. An attempt was made, through letter and telephone communication with parents, to recruit participants with "understandable" speech and knowledge of the numbers 1-9. However, four children (three DS and one MH) with especially difficult-to-understand speech (subjectively determined by the experimenters) and two children (both MH) unable to recognize, by sight, all nine digits were included in the final samples. The samples were matched on Stanford-Binet IQ, $t(50)=.616$ (DS mean=39.7, SD=7.3; MH mean=40.9, SD=6.2) and chronological age, $t(50)=.096$ (DS mean=226.1 months, SD=40.3; MH mean=225.0 months, SD=40.5). An additional seven participants were excluded from the study because of no speech (two MH), an

inability to understand (or failure to cooperate during) 40% or more of the tasks (three DS and one MH), or later discovery of educable (rather than trainable) school placement (one MH).

Tasks

Two expressive language subtests of the Test of Language Development-2 Primary (TOLD-2P; Newcomer & Hammill, 1988) were used. Pilot testing revealed that truncated versions of each subtest were desirable because of the slowness and poor articulation of many subjects' speech and the frustration experienced by some subjects with the items. One expressive language task--the first eight items of the Oral Vocabulary Subtest--required the subject to define common words such as "cow", "ice", and "rest". If a response was not forthcoming or if the response was vague, inaccurate, or incomplete, the examiner was allowed to use the prompt, "Tell me more about it," no more than twice per item. Each subject was given all eight items and could earn one point per item by offering either a precise definition or two less descriptive characteristics (Newcomer & Hammill, 1988). The other expressive language task--the first eight items of the Sentence Imitation Subtest--required the subject to repeat a sentence spoken by the examiner (e.g., "Yesterday my aunt forgot her lunch."). If the subject failed to respond or asked for a repetition, the examiner proceeded to the next item. Each subject was given all eight items and could earn one point per item by correctly imitating the entire sentence (misarticulations were ignored). In the TOLD-2P theoretical model, both subtests stress speaking (expressive) skills, with Oral Vocabulary focusing on semantic knowledge and Sentence Imitation focusing on syntactic knowledge.

For each expressive language task the examiner turned on a cassette tape recorder and microphone, explained the task, provided practice items, and remained silent after speaking the test item. The tapes were later measured for oral response time (the duration between the beginning of the examiner's last spoken word and the beginning of the subject's response). Reliability checks were performed on a randomly-selected sample of 25% of the tapes by an independent listener; interobserver correlations between timing estimates were .99 for the oral vocabulary task and .99 for the sentence imitation task. Although we had hoped to rate subjects' "verbosity" (number of words spoken in response to oral vocabulary items), it was difficult to reach agreement because of poor intelligibility of some participants' speech. Speech misarticulations of adolescent DS individuals have been discussed elsewhere (e.g., van Borsel, 1988) and, as Miller (1987) noted, it is often difficult to interpret DS speech without knowing in advance what is being said.

Receptive language measures included picture vocabulary and sentence comprehension tasks in which the subject pointed to one of four pictures representing the word or sentence spoken by the experimenter [described in detail by Marcell, Croen, and Sewell (1990a)]. Other tests included: a) an auditory short-term memory task [digit recall, described by Marcell et al (1990a)]; b) a comprehensive audiological assessment administered by clinical audiologists [pure tone air conduction and speech reception threshold measurements described by Marcell, Cohen, Weathers, Wiseman, Croen, and Sewell (1990)]; c) two computer-based memory experiments (not reported here), and d) a backmasking task which measured speed of word identification. In the backmasking

Sentence Imitation Analyses

DS subjects precisely repeated fewer sentences than MH subjects: DS mean=1.1 (SD=1.4), MH mean = 2.9 (SD=2.3); t(50)=3.375, $p \leq .001$. In the TOLD-2P scoring system, an individual who replies "I don't know", or who repeats only one word of a nine-word sentence, receives the same score (0) as an individual who successfully repeats eight of the words. Therefore, the data were rescored (by awarding one point for each correctly-recalled word out of a total of 54) to provide a measure of how much information was remembered and expressed. The rescoring yielded the same pattern of DS difficulty: DS mean=26.5 (SD=12.0), MH mean=37.1 (SD=14.9); t(49)=2.798, p=.007. Analysis of oral response times revealed that DS individuals were also slower to initiate their sentence imitations: DS mean=2.0 sec (SD=.9), MH mean=1.5 sec (SD=.6), t(49)=2.048, p=.046.

Correlational Analyses

Correlations were computed between expressive language measures and measures of language comprehension, auditory short-term memory, rapid word identification (backmasking task), and hearing ability. The effects of IQ and CA were statistically removed by using partial correlations (each evaluated at alpha=.05).

Oral Vocabulary. Neither DS nor MH subjects showed a relationship between number of words defined and number of: a) sentences repeated, b) vocabulary words comprehended, and c) digit sequences recalled. Oral vocabulary did correlate, however, with number of sentences comprehended [DS r(23)=.572; MH r(23)=.501] and, in DS subjects only, with number of words identified in the rapid backmasking task [r(23)=.404]. For the DS group, those subjects who responded more slowly on the oral vocabulary task tended to define fewer words, r(22)= -.422, and repeat fewer sentences, r(22)= -.401. No group showed an association between measures of oral vocabulary and hearing ability.

Sentence Imitation. For both DS and MH subjects, number of sentences repeated correlated with: a) auditory recall of digit sequences [DS r(23)=.416; MH r(21)=.608], and b) comprehension of grammatically difficult sentences [DS r(23)=.514; MH r(23)=.511]. For DS subjects only, number of sentences repeated correlated with number of words identified in the rapid backmasking task, r(23)=.407. Sentence repetition did not relate to single word comprehension or oral vocabulary in either group. Subjects in both groups who responded more slowly on the sentence repetition task tended to repeat fewer sentences [DS r(22)= -.433; MH r(23)= -.455]. No group showed an association between measures of sentence repetition and hearing ability.

Discussion

DS and MH individuals demonstrated different patterns of expressive language ability. Although both groups were equivalent in their ability to define words, DS subjects had more difficulty

repeating sentences. The latter result replicated Marcell et al's (1987) post hoc finding of poor DS vs MH performance on sentence repetition items and confirmed that the DS sentence repetition problems reported by Gordan and Panagos (1976) and Semmel & Dolley (1971) are indeed more severe in mentally retarded individuals with Down syndrome. Difficulty in repeating sentences is also consistent with findings of poor DS vs MH performance on laboratory-based digit and word auditory serial recall tasks (Marcell, Harvey, & Cothran, 1988; Marcell & Weeks, 1988; McDade & Adler, 1980; Smart, O'Grady, & Das, 1982; Varnhagen, Das, & Varnhagen, 1987). In light of the well-known prevalence of hearing problems in DS individuals (Balkany, 1980; Dahle & McCollister, 1986; Keiser, Montague, Wold, Maune, & Pattison, 1981), it is interesting to note that sentence repetition difficulty was not associated with poor hearing ability.

Correlational analyses revealed several important relationships that may assist in understanding performance on the sentence imitation task. First, for all subjects, the ability to imitate sentences was related not to the expressive ability to define words, but instead to skill in comprehending sentences and remembering sequences of digits. It might be inferred that the expressive or vocalizing component of sentence imitation was less central to accurate performance than was the ability to remember the precise sequence of words. Second, part of the DS difficulty in repeating a sequence of items might have been a function of slower identification of individual words in the sequence. Subjects who were slower to begin their sentence imitations tended to repeat fewer sentences; moreover, DS subjects who had difficulty identifying words on the rapid backmasking task also tended to repeat fewer sentences. It is possible, then, that slow identification of individual words by DS subjects was an important limiting factor during the sentence imitation task (cf Dempster, 1981). As Huttenlocher and Burke (1976) have noted, individuals who devote more effort simply to identifying incoming items will have less capacity for retaining those items already identified.

References

Andrews, R.J., & Andrews, J.G. (1977). A study of the spontaneous oral language of Down's syndrome children. The Exceptional Child, 24, 86-94.

Balkany, T.J. (1980). Otologic aspects of Down's syndrome. Seminars in Speech, Language and Hearing, 1, 39-48.

van Borsel, J. (1988). An analysis of the speech of five Down's syndrome adolescents. Journal of Communication Disorders, 21, 409-421.

Burr, D.B., & Rohr, A. (1978). Patterns of psycholinguistic development in the severely mentally retarded: A hypothesis. Social Biology, 25, 15-22.

Cornwell, A.C. (1974). Development of language, abstraction, and numerical concept formation in Down's syndrome children. American Journal of Mental Deficiency, 79, 179-190.

Dahle, A.J., & McCollister, F.P. (1986). Hearing and otologic disorders in children with Down syndrome. American Journal of Mental Deficiency, 90, 636-642.

Dempster, F.N. (1981). Memory span: Sources of individual and developmental differences. Psychological Bulletin, 89, 63-100.

Evans, D. (1977). The development of language abilities in mongols: A correlational study. Journal of Mental Deficiency Research, 21, 103-117.

Gibson, D., & Harris, A. (1988). Aggregated early intervention effects for Down's syndrome persons: Patterning and longevity of benefits. Journal of Mental Deficiency Research, 32, 1-17.

Gordan, W.L., & Panagos, J.M. (1976). Developmental transformational capacity of children with Down's syndrome. Perceptual and Motor Skills, 43, 967-973.

Huttenlocher, J., & Burke, D. (1976). Why does memory span increase with age? Cognitive Psychology, 8, 1-31.

Keiser, H., Montague, J., Wold, D., Maune, S., & Pattison, D. (1981). Hearing loss of Down syndrome adults. American Journal of Mental Deficiency, 85, 467-472.

Leuder, I., Fraser, W.I., & Jeeves, M.A. (1981). Social familiarity and communication in Down syndrome. Journal of Mental Deficiency Research, 25, 133-142.

Mahoney, G., Glover, A., & Finger, I. (1981). Relationship between language and sensorimotor development of Down syndrome and nonretarded children. American Journal of Mental Deficiency, 86, 21-27.

Marcell, M.M., Cohen, S., Weathers, P., Wiseman, P., Croen, P., & Sewell, D. (1990). Hearing abilities of Down syndrome and other mentally handicapped adolescents. Paper submitted for presentation at the meeting of the American Psychological Association, Boston.

Marcell, M.M., Croen, P.S., & Sewell, D.H. (March, 1990a). Language comprehension in Down syndrome and other trainable mentally handicapped individuals. Paper presented at the meeting of the Conference on Human Development, Richmond, VA.

Marcell, M.M., Croen, P.S., & Sewell, D.H. (1990b). Spoken word identification by Down syndrome and other mentally handicapped adolescents. Manuscript in preparation.

Marcell, M.M., Harvey, C.F., & Cothran, L.P. (April, 1987). Profile of the language abilities of Down's syndrome adolescents. Paper presented at the meeting of the Society for Research in Child Development, Baltimore, MD.

Marcell, M.M., Harvey, C.F., & Cothran, L.P. (1988). An attempt to improve auditory short-term memory in Down's syndrome individuals through reducing distractions. Research in Developmental Disabilities, 9, 405-417.

Marcell, M.M., & Weeks, S.L. (1988). Short-term memory difficulties and Down's syndrome. Journal of Mental Deficiency Research, 32, 153-162.

McDade, H.L., & Adler, S. (1980). Down syndrome and short-term memory impairment: A storage or retrieval deficit? American Journal of Mental Deficiency, 84, 561-567.

Miller, J.F. (1987). Language and communication characteristics of children with Down syndrome. In S.M. Pueschel, C. Tingey, J.E. Rynders, A.C. Crocker, & D.M. Crutcher (Eds.), New perspectives on Down syndrome. Baltimore: Brookes (pp. 233-262).

Newcomer, P.L., & Hammill, D.D. (1988). Test of Language Development-2 Primary. Austin, TX: Pro-Ed.

Rogers, M.G.H. (1975). A study of language skills in severely subnormal children. Child: Care, Health and Development, 1, 113-126.

Rondal, J.A., Lambert, J.L., & Sohier, C. (1981). Elicited verbal and nonverbal imitation in Down's Syndrome and other mentally retarded children: A replication and extension of Berry. Language and Speech, 24, 245-254.

Semmel, M.I., & Dolley, D.G. (1971). Comprehension and imitation of sentences by Down's syndrome children as a function of transformational complexity. American Journal of Mental Deficiency, 75, 739-745.

Snart, F. O'Grady, M., & Das, J.P. (1982). Cognitive processing by subgroups of moderately mentally retarded children. American Journal of Mental Deficiency, 86, 465-472.

Sommers, R.K., & Starkey, K.L. (1977). Dichotic verbal processing in Down's syndrome children having qualitatively different speech and language skills. American Journal of Mental Deficiency, 82, 44-53.

Varnhagen, C.K., Das, J.P., & Varnhagen, S. (1987). Auditory and visual memory span: Cognitive processing by TMR individuals with Down syndrome or other etiologies. American Journal of Mental Deficiency, 91, 398-405.