

# THE LINGUISTIC BEHAVIOUR OF THE HYDROCEPHALIC MENTALLY HANDICAPPED ADULT

W. I. FRASER\*, J. AGNEW† and R. GRIEVE‡

## Introduction

In linguistic studies the mentally handicapped are often regarded as a homogeneous group. A preliminary step in a remedial project must differentiate those clinical categories which might be linguistically atypical. One such group are hydrocephalic children who commonly show a Chatterbox Personality (Hadenius et al, 1961; Badell Ribera et al, 1966; Ingram and Naughton, 1962). This appears to be irrespective of additional handicaps, such as spina bifida and the presence or absence of valves. The features of this talkativeness are high syntactical sophistication; high verbal output (i.e., increased total number of words spoken in the informal conversation, but not more repetitive language); more inappropriate and bizarre language than normal children; and I.T.P.A. profiles below that of control normal intelligence groups on all sub-tests, but reduced impairment on grammatical closure and auditory-vocal sequencing abilities (Swisher and Pinsker, 1971). Such features occasionally give the clinician a misleading impression of higher intelligence than is borne out by the performance intelligence. Several authors (Diller et al, 1966; Fleming, 1968) had noted that the inappropriate quality of output decreases with age, the older children exhibiting appropriate language behaviour. The questions that we have attended to are: how does the language output of the hydrocephalic adult vary from that found by Swisher and Pinsker (1971) in the hydrocephalic child, and does it differ from other mentally handicapped adults of similar intelligence?

## Subjects

The subjects were five adult hydrocephalics. Two suffered from major epilepsy, one had spina bifida cystica (Lesion L2), and one a mild left hemiparesis and occipital encephalocoele; one had severely limited visual acuity. They did not suffer from psychiatric illness and were not selected on grounds of significant verbal facility.

The controls were randomly selected from a group of high grade mentally handicapped, who matched approximately the W.A.I.S. full-scale intellectual abilities of the hydrocephalic group, and whose ages similarly matched the defective group. They had approximately similar institutional experience. Three were considered "multifactorially" mentally handicapped individuals, and the other two had clinical signs in early childhood indicating minimal brain damage. One suffered from minor epilepsy, one had a hearing loss in her left ear (of perceptive origin) 20 decibels, confirmed by audiometry, but her overall conversational hearing was satisfactory. The age range for the subjects was 22 to 47, mean 31, and the controls, 22 to 40, mean 33; and the full-scale intelligence quotients for subjects was range 51—59, mean 53; and 47—72 for the controls, mean 55.

## Procedure

Two assessments of the subjects' verbal ability were made. First they were presented with a partially structured conversational interview which was tape-recorded for later analysis, and on a subsequent occasion they were presented with the Illinois Test of Psycholinguistic Abilities (1968 revision of the Experimental Edition).

\*Lynebank Hospital, Dunfermline.

†Stratheden and Associated Hospitals, Cupar.

‡St. Andrew's University.

The first assessment was employed because of the previous report (Swisher and Tinsker, 1971) that differences in verbal behaviour occur between hydrocephalics and non-hydrocephalics in early childhood if that behaviour is obtained in informal interviews rather than in standardised test situations. The second assessment, the I.T.P.A., is based on Osgood's notions of the communication process (Osgood, 1957) and provides a means of assessing some of the psychological functions which operate in communication activities.

The partially structured interviews, individually conducted by the same interviewer who was not known to the subjects, took place in familiar surroundings where a customary nurse was present except for one interview conducted at home.

The interviews were tape-recorded on a high quality tape-recorder and later transcribed by the interviewer. They consisted of brief informal conversational interviews during which the interviewer presented questions on a prepared set of topics. After each subject had been asked how he/she was feeling that day, the interviewer asked if the subject knew what the tape-recording machine was (no effort was made to conceal the tape-recorder or microphone); whether they had had their voice tape-recorded before, and if so, when. Subjects were then asked to give their full name, their age and place of birth. The interviewer then made a complimentary comment on an article of clothing that the subject was wearing, asked whether the subject often wore it, when and where it had been bought or when it had been given and by whom. Subjects were then asked about their holiday plans—where they were going, when and with whom. After subjects had been asked if they enjoyed chatting, they were asked what they were going to do after the interview, which was then terminated.

In administration of the I.T.P.A. only the tester was present. The test session was preceded by 5—10 minutes of informal conversation. Four of the control and three of the hydrocephalic group were seen in familiar situations in their own hospital; one of the controls and one of the hydrocephalics were seen in out-patient departments of general hospitals in their home towns; and one hydrocephalic subject was seen at home. All subjects were highly co-operative except one control, who refused to attempt Auditory Sequential Memory and Manual Expression, on the basis that he was unable to do the tasks. Incomplete results are also available for the hydrocephalic mentioned above owing to a subsequent severe illness not in evidence at the time of testing.

## Results

With the hydrocephalic subjects the interviews lasted about  $3\frac{1}{2}$  minutes on average (3.25 minutes, range 2.08—5.00), during which the interviewer produced an average of about 55 utterances (55.4; range 39—72), each about 6 morphemes\* in length (5.93; range 5.44—6.26). With the control subjects the interviews lasted about  $3\frac{1}{2}$  minutes on average (3.43; range 2.13—5.30), during which the interviewer produced an average of about 58 utterances (58.4; range 40—72), each about 6 morphemes in length (5.90; range 5.17—6.63). Thus the interviewer's verbal behaviour was not significantly different between the two groups.

Data from the informal interviews for the two groups of subjects appear in Table 1. Entries represent the number of utterances, the number of morphemes, and MLU (mean length of utterance in morphemes) for each subject. In addition, Table 1 shows entries for a series of characteristics of each subject's verbal output—namely (A) inappropriate responses or failures to respond, (B) number of false starts or pauses, (C) number of times subject's speech overlapped with that of the interviewer,

\*Morpheme—the smallest unit of speech conveying meaning.  
Phoneme—the smallest unit in a language.

(D) number of subject's utterances which volunteered information beyond that required to answer the interviewer's questions, and (E) number of times subjects produced one-word answers to the interviewer's questions. (Clearly, these categories are not mutually exclusive.)

Inspection of Table 1 indicates that the performance of the two groups is remarkably similar on all indices listed. Hydrocephalic subjects produce an average of about 40 utterances (40.6; range 25—62), each about 4 morphemes in length (4.23; range 1.80—5.96). The proportion of inappropriate responses/failures to respond is low (0.04), false starts are not frequent (0.12), subject's speech rarely overlaps with that of the interviewer (0.04), little extra information is volunteered (0.15) and one-word answers are produced with some frequency (0.40). Control subjects produce an average of about 46 utterances (46.6; range 22—80), each about 4 morphemes in length (4.48; range 2.68—9.79). Again, the proportion of inappropriate responses/lack of responses is low (0.03), little extra information is volunteered (0.20), and one-word answers are produced with some frequency (0.33). The exception to this pattern is the fifth control subject. This individual showed verbal prolixity, resulting in production of 80 utterances, on average about 10 morphemes in length, achieved via a strategy of producing utterances with pauses (proportion 0.35, index B) and adding strings of additional clauses and sentences, volunteering a great deal of extra information (proportion 0.40, index D), and producing the lowest proportion of one-word answers of any subject (0.09, index E). However, practically none of her conversation is inappropriate (index A). Even when the data of this talkative subject is excluded from the means the control group, data between the groups are still comparable.

Inspection of the I.T.P.A. results (Table 2) shows differences on four subjects, two of which proved statistically significant—i.e., with Grammatical Closure (the ability to make use of redundancies of oral language in handling syntax),\*  $t=8.359$ ,  $df=4$ ,  $p<.01$ ; and with Auditory Closure (the ability to fill in deleted phonemes in auditory presentation),  $t=4.208$ ,  $df=4$ ,  $p<.05$ . Despite the small sample, the magnitudes of experimental effect (Friedman, 1968) are high (0.92 and 0.81 respectively).

## Discussion

An index which has not been calculated on the informal interview data is that for verbal diversification, i.e., scope of vocabulary, or putting it the other way round, repetitiveness. Taking an index for repetitiveness for each subject such as a TTR (type-token ratio) and then making comparisons across groups is inadmissible due to the differing lengths of interview protocols, TTRs only being appropriate in comparison with speech samples of similar length. Alternative measures of verbal diversification, such as that of Carroll (see Miller, 1951; 122 ff), are obviated by the proportion of one-word answers.

One feature of the data in Table 1 that deserves attention is that appearing in index A—the proportion of inappropriate responses/failures to respond is extremely low in both groups (0.04 in the hydrocephalic group, 0.03 in the control group). It has recently been called to notice that one of the most striking features of language use, whether by adults or normal children (even during language acquisition), is the appropriateness of utterances to the social or extra-linguistic contexts in which the utterances are produced (Campbell and Wales, 1970). Both the hydrocephalic and the control subjects exhibit this. Thus for the conversational interviews, in short we can say that not only is the language of our adult hydrocephalic and control subjects remarkably similar in quantity and character, but also that in such contexts their language is overwhelmingly appropriate.

\*Syntax is the organisation of sentences. Morphology is the organisation of words.

However, although there is little difference in the language characteristics of our two groups in the context of conversational interviews, the differences observed on the I.T.P.A. sub-tests Grammatical Closure and Auditory Closure suggest that adult hydrocephalics retain some superiority over controls in respect of Syntax and Phonology. Clearly, such a suggestion could only be confirmed by increasing the sample size.

Retardates typically score low on the I.T.P.A. grammatical closure sub-test (Mueller and Wearer, 1964) and in complexity of their syntactic constructions (Goda and Griffith, 1962). Studies comparing institutionalised and non-institutionalised retardates (Lozar et al) show that the latter are more comparable in syntactical ability to normals of the same chronological age. The present results suggest that such studies might gain in detail by considered exclusion of the clinical group of hydrocephalics because of their preserved syntactical skills in a context of standardised assessment procedures.

Swisher and Pinsker consider the most interesting question to be the effect of social reinforcement on hyperverbality. In childhood hydrocephalus the superior production of syntactical and phonological aspects of language may result in reinforcement of language output, which recedes on maturity, when it becomes less attractive to the listener.

### Summary

The linguistic behaviour of five mentally handicapped hydrocephalic adults was compared with matched non-hydrocephalic controls, using a partially structured conversational interview and the Illinois Test of Psycholinguistic Abilities. The recession of the hydrocephalic child's inappropriate output was corroborated. There was some indication that the disproportionately superior syntactical and morphological abilities of the hydrocephalic child were preserved.

### Acknowledgement

This pilot study forms part of a research project into language and handicap being jointly conducted by the Psychological Laboratory, University of St. Andrew's and Lynebank Hospital, Dunfermline. Acknowledgement is made to the research support being afforded by the Scottish Home and Health Department.

### References

- Badell-Ribera, A., Shulman, K. and Paddock, N. (1966). The relationship of non-progressive hydrocephalic functioning in children with spina bifida cystica. *Paediatrics*, 37, 787.
- Campbell, R. N. and Wales, R. J. (1970). The study of language acquisition. In J. Lyons (Ed.) *New Horizons in Linguistics*. Penguin: Harmondsworth.
- Diller, L., Paddock, N., Badell-Ribera, A. and Swinyard, C. A. (1966). Verbal behaviour in spina bifida children. In Swinyard, C. A. (Ed.) *Comprehensive Care of the Child with Spina Bifida*. Rehabilitation Monograph, New York, p. 100.
- Fleming, C. P. (1968). The verbal behaviour of hydrocephalic children. *Develop. Med. Neurol. Suppl.*, 15, 74.
- Friedman, H. (1968). Magnitude of Experimental Effect. *Psychological Bulletin*, 70, 245.
- Hadenius, A. M., Hagberg, B., Hyttras-Bensch, K. and Sjøvgen, I. (1962). The natural prognosis of infantile hydrocephalics. *Acta Paediat.*, 1, 117.
- Ingram, T. T. S. and Naughton, J. A. (1962). Paediatric and psychological aspects of cerebral palsy associated with hydrocephalics. *Develop. Med. Child Neurol.*, c, 287.
- Lozar, B., Wepman, J. M. and Hass, W. (1973). Syntactic indices of language use of mentally retarded and normal children. *Language and Speech*, 16, 22.
- Miller, G. A. (1951). *Language and Communication*. McGraw-Hill: New York.
- McCarthy, J. J. and Kirk, S. A. (1961). *The Illinois Test of Psycholinguistic Abilities* (Experimental Edition). Urbana, Ill.: Institute for Research in Exceptional Children.
- Swisher, L. P. and Pinsker, E. (1971). The language characteristics of hyperverbal hydrocephalic children. *Develop. Med., Child Neurol.*, 13, 746.

**TABLE 1**  
**Data for Subjects**

	Hydrocephalics Mean	Control Mean
Utterances	40.6	46.6
Morphemes	192.0	256.6
M.L.U.	4.23	4.48
(A) Inappropriate responses/	1.4	1.2
(B) False starts/pauses	5.0	10.4
(C) Overlaps	1.4	1.4
(D) Extra information	6.0	9.4
(E) "Yes"/"No" responses	15.2	14.4
(F) One-word answers	16.4	15.2

**TABLE 2**  
**I.T.P.A. Scores**

	Hydrocephalic Group Mean	Control Mean
Auditory Reception	24.5	20
Visual Reception	11.8	15.6
Visual Sequential	7.5	6.4
Auditory Association	23.4	17.4
Auditory Sequential	24.4	22.75
Visual Association	14.2	17.2
Visual Closure	8	13.4
Verbal Expression	15.75	13.8
Grammatical Closure	25	13.6
Manual Expression	15	18
Auditory Closure	14	7.4
Sound Blending	17.75	11.8