

A COMPARISON OF THE PERFORMANCE OF FIVE APHASIC PATIENTS ON DIFFERENT TESTS OF LANGUAGE ABILITY

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SUMMARY

The performance of five aphasic patients was rated on three tests of language ability: The Minnesota Test for Differential Diagnosis; Luria's Tests of aphasia; and a Test of expressive language based on graded stimuli from the Peabody Picture Vocabulary Test. In order to assess communicative ability of the subjects, each expressive language sample was administered to four judges and a score of communicative success was computed. The study aimed at comparing each subject's performance on these tests of aphasia and its relationship to the degree of communicative success, in an attempt to ascertain which test is the most accurate predictor of "amount" of aphasic impairment. It also aimed at extracting those variables most useful and appropriate in the diagnosis of the impairment found in aphasic patients. Inter-test correlations revealed that tests of aphasia appear to be accurate predictors of "amount" of communicative success. Inter-item comparison revealed fourteen sub-tests which indicated greatest difference in the performance of all the subjects.

OPSOMMING

Die prestasie van vyf afasie pasiënte is met drie toetse van taalvermoë vergelyk. Die Minnesota Toets vir Differentiële Diagnose, Luria se Toetse vir Afasie en 'n toets vir ekspressiewe taal is gebruik. Laasgenoemde toets is op gegradeerde stimuli van die Peabody Prent Taal Toets gebaseer. Ten einde die kommunikasie vermoë van die pasiënte te bepaal, is elke ekspressiewe taalmonster aan vier beoordelaars oorhandig en 'n telling van kommunikasie sukses is bepaal. Die doel van die ondersoek was om 'n verband tussen hierdie toetse van afasie en die graad van kommunikasie sukses te verkry in 'n poging om vas te stel watter toets die mees akkurate voorspelling vir afasiese belemmering sal bied. Dit stel ook ten doel om daardie veranderlikes wat nuttig en bruikbaar is in die diagnose van die belemmering in die afasie pasiënt, uit te lig. Inter-toets-korrelasies dui aan dat toetse van afasie akkurate voorspellings van die mate van kommunikasie sukses weergee. Inter-itemvergeliking dui aan dat daar veertien sub-toetse nodig is om die grootste verskille tussen pasiënte aan te dui.

When confronting the problem of the language breakdown in aphasia, it falls to the speech pathologist to determine the nature of the problem and the most suitable techniques for rehabilitation. It is her responsibility to select the most accurate and appropriate method of diagnosis, and in order to make the therapeutic process maximally successful, she must be fully aware of the extent to which the suddenly acquired impediment affects the patient as a total and communicating person.

An assumption underlying all approaches to the study of aphasia, is that it is a disturbance of language, and all investigators aim to study this aspect. However, this has a further implication. Verbal language has become man's prime

means of communication, so that loss of ability to use language effectively infers loss of ability to communicate effectively. Aphasia is therefore primarily a disturbance in the communicative process.

This study was prompted by questioning the extent to which the people who treat aphasics, the speech pathologists, are aware not only of the best tests of aphasia, but the degree to which the patient's communication is limited. This implies that it is not only the language impairment that must be studied, but also the communication impairment. Consequently both these aspects must be considered in treatment.

Currently, there are three popular approaches to the study of aphasia: Schuell's⁸ approach, Luria's² approach, and that of the psycholinguists.³ Schuell emphasizes the perceptual processes involved in language; Luria stresses the highly organized interaction of functional units in the cortical centres of the brain; and the psycholinguists emphasize acquisition of the rules of language – these approaches are not mutually exclusive, each approach incorporating something of the others.

Uriel Weinreich⁵ has defined communication as the intentional induction by means of symbols of a certain state in the receiver which corresponds to that in the sender. Thus, successful communication may be regarded as the listener's comprehension of the message as intended by the speaker. Even though the language of the aphasic may not be faultless in terms of skills underlying language or in terms of the rules of the language, he may still be able to convey a message. The listener, by having his own intact competence, may still infer and comprehend the intended communication.

Thus tests of aphasia directed towards the examination of the functions related to language, and to language itself, are in essence evaluating the patient's ability to communicate. The question is – to what extent are tests of aphasia reliable as indicators of communicative ability or "amount" of aphasic impairment? This study aims at investigating:

- (i) the relationship between performance on the three tests of aphasia;
- (ii) the relationship between performance on the tests of aphasia and the patient's ability to communicate his ideas;
- (iii) it also aims at extracting those items from all the tests which reveal the greatest difference between the subjects on the basis of an inter-item correlation, in an attempt to use them as most accurate predictors of communicative success.

METHOD

CRITERIA FOR SELECTION OF SUBJECTS:

Criteria for selection were very broad.

- (1) Each subject had to be diagnosed as aphasic by a neurologist and a speech therapist, i.e. as having suffered damage to that part of the C.N.S. necessary for language, and displaying evidence of loss of linguistic skills.¹⁰
- (2) Each subject had to be neurologically stable (the minimum time being six months after onset of the aphasic symptoms).

- (3) Each subject had to be regarded as physically healthy and able to cope with the large test battery.

SUBJECTS

Five aphasic adults served as subjects. Four were males and one was a female; three were right handed and two were left handed. Their age range was 27-70 years, with the mean of 56 years. Two of the subjects were university graduates, two had matriculated and one had a standard eight qualification. At present two of the subjects are working, the other three have no fixed occupation. In four subjects, aphasia was caused by cerebrovascular accidents, and in one subject it was caused by trauma. Date of onset ranged from one to ten years, the mean time being four years. Diagnosis at the time of onset revealed global aphasia with no peripheral involvement in two subjects, global aphasia with right hemiparesis in two subjects, and expressive aphasia with right hemiplegia in one subject. Amount of therapy received ranged from two months to four-and-a-half years. Recent diagnosis by speech therapists indicated predominantly expressive aphasia in two subjects, predominantly nominative aphasia in one subject, jargon aphasia in one subject, and predominantly expressive aphasia with hemi-paresis and apraxia in one subject.

PROCEDURE

Each patient was tested for approximately ten hours over a period of three to four weeks. With two subjects the order of administration was The Minnesota Test for Differential Diagnosis (M.T.D.D.A.), The test of Expressive Language, and Luria's Tests of Aphasia.

With three subjects, Luria's tests were administered first, and the M.T.D.D.A. was administered last. The order was changed to control for the variable of attitude towards tests affecting test performance in the last tests. It was felt that it would be more suitable to administer the test of expressive language second, to change the nature of testing which was similar for the other two tests.

Each test session was terminated when the subject began to show signs of fatigue.

Tests

The M.T.D.D.A. The standardised test was administered in accordance with the stipulated test procedure.

Luria's Tests. The principles described by Luria² formed the basis in the construction of the test items. His full battery of tests was administered. Where possible exact items were extracted e.g. tests of visual perception, but in most cases the items were devised by the experimenter.

Test of Expressive Language. The method described below was selected in accordance with the requirements stipulated by Margo E. Wilson¹¹ for collecting a language sample.

- (1) All subjects must be given standard instructions.
- (2) A standard set of stimulus material must be used that is easily available and convenient to use. Picture stimuli from the Peabody Picture Vo-

cabulary Test were used. Fifty pictures of graded difficulty along the whole range of the test were shown to each subject. The standardised instruction was: "tell me as much as you can about each picture". Each response was transcribed and analysed. A collection of fifty to eighty linguistic responses formed the language sample for each subject.

This method was chosen because:

- (a) it assured the experimenter that a minimum of fifty responses would be emitted.
- (b) the experimenter would know the nucleus of the target sentence.

EVALUATION OF COMMUNICATIVE SUCCESS

Four judges were used to rate communicative success. All the judges were non-aphasic adults with an age range of 25 to 55 years. All judges had matriculation qualifications.

All sentences that were to be rated by the experimenter as having one or more errors were read by the experimenter to the four judges in one session. The instructions given were: "If you think you understand the sentence, write what you think that particular sentence is. If you do not understand at all, place a cross next to the number of that sentence".

The experimenter made every attempt to reproduce the sentences as the subjects had spoken, considering pause, intonation and gesture in order to convey the full communication as given by the subjects, to the judges.

The method was chosen to evaluate the degree to which these aphasic patients could communicate their thoughts about the picture to the judges who were unaware of the original stimuli.

SCORING

M.T.D.D.A. Performance was scored according to the criteria as stated in the test manual.

Luria's Tests. Criteria for passing or failing were established for each subtest, and performance of each subject was scored according to these criteria.

Expressive Language. Each sample was transcribed and total number of sentences was counted. Following psycholinguistic principles, each sample was scored in terms of phonemic, semantic and syntactic errors. *Phonemic errors* were regarded as breakdowns in the use of sounds to differentiate the meanings of words.³ These included omissions, distortions, substitutions and additions. A word may contain more than one phonemic error. *Semantic errors* were regarded as the inability to find a word, or inappropriate use of a word. One word may be substituted for another, or a jargon word may be substituted. Inappropriate addition of words or jargon was considered as a semantic error. A *syntactic error* was regarded as any error in the sentence structure caused by incorrect application of rules or omission to apply a rule where indicated. Syntactic errors covered the range of transformational rules found within normal language.

Within each linguistic category scores of one to five were given in accordance with the number of errors in that particular category occurring within the sentence.

5 – No errors present in the surface structure

4 – One error " " " " "

3 – Two errors " " " " "

2 – Three errors " " " " "

1 – More than three errors present in the surface structure, but the sentence still conveys meaning.

0 – Unacceptable sentence.

Each subject was given a score for phonemic performance, semantic performance and syntactic performance, as well as a total score for expressive language ability.

Communicative Success. Each sentence proposed by the judges that indicated understanding of the target sentence was given a score of one, and each sentence that was incorrectly understood or not understood at all, was given a score of zero. If the experimenter was unsure of the target sentence, and there was no uniformity in the understanding as portrayed by the judges, the sentence was automatically scored zero. Generally, the experimenter was aware of the target sentence owing to prior knowledge of the stimulus, and questioning of the subject at the time the response was emitted. A score of total number of sentences conveying the correct meaning to the listener was computed as the score of communicative success.

Inter-item Comparison of Performance. As the number of subjects in the study was small, statistical inter-correlation was not possible. Thus a more subjective method was adopted whereby each sub-test score of one subject was compared to that of every other subject.

Subjects were compared in pairs, resulting in ten sets of comparisons. The difference between each pair of scores was calculated and the first fifteen scores indicating greatest degree of difference were ranked. Each item was then scored according to the number of times it was ranked. The fourteen items selected were those that revealed the greatest differences in more than half of the comparisons made.

In all computations scores were computed as percentages in order to provide a standard basis for comparison.

RESULTS:

GENERAL COMPARISON OF THE THREE TEST SCORES:

1. Is there any difference between the scores obtained on each of the three tests?

A two-factor analysis of variance for repeated measures showed that there was no significant difference between the three sets of scores. ($F=0,3569$, $df = 2/8$, NS).

TEST	ITEM	SUBJ.4	SUBJ.5	DIFF.	RANK
LURIA	1. Preliminary Conversation	41,67	100,00	58,33	14
	2. Motor Functions	58,67	74,67	15,00	
	3. Phonetic Anal. & Synth.	0,00	92,00	92,00	3
	4. Writing	64,00	100,00	36,00	
	5. Reading	39,06	90,63	51,57	
	6. Automatic Speech	15,52	100,00	84,48	8
	7. Imitative Speech	20,00	89,33	69,33	12
	8. Nom. Function of Speech	13,89	100,00	86,11	6
	9. Predicative Function	26,67	86,67	60,00	13
	10. Grammatic Function	0,00	90,00	90,00	5
	11. Comp. of No. Structure	31,43	100,00	68,57	13
	12. Arith. Operations	0,00	100,00	100,00	1
	13. Phonemic Hearing	20,00	94,29	74,29	9
	14. Word Comprehension	30,00	100,00	70,00	11
	15. Sentence Comprehension	45,00	100,00	55,00	
	16. Logical Gram. System	26,00	80,00	54,00	
	17. Acoustic Motor Co-ord.	60,00	86,67	26,67	
	18. Visual Perception	63,33	91,67	28,34	
	19. Mnestic Processes	25,00	80,00	55,00	
	20. Intellect. Processes	0,00	95,71	95,71	2
EXP. LANG.	1. Phonemic Performance	7,80	92,80	85,80	7
	2. Semantic Performance	7,80	98,00	90,20	4
	3. Syntactic Performance	10,60	66,00	55,40	15
SCHUELL	1. Auditory Discrim.	52,14	88,89	36,75	
	2. Vis. & Read. Disturbances	45,00	93,75	48,75	
	3. Disturb. of Numerical Rel. & Arith. Processes	27,27	100,00	72,73	
	4. Sp. & Lan. Disturbances	27,27	100,00	72,73	10
	5. Visuo-Motor & Writing Disturbances	51,75	91,23	39,48	

TABLE I. Example of Inter-item Comparison – Subjects 4 and 5.

2. Is there a general similarity or concordance between the three tests of scores, i.e. are the rankings of subjects fairly similar on all three tests?

The Kendall coefficient of concordance (W) showed that there was a significant concordance between the three sets of scores. ($W = 0,8533$, $S = 80$, $p 0,01$).

3. Is there direct correlation between:

(a) Luria's and Schuell's test scores?

The Spearman rank correlation coefficient (r_s) showed a perfect correlation of one between the two tests.($r_s = 1,00$, $N = p 0,01$).

(b) Luria's and expressive language test scores?

The same statistical test showed a correlation of 0.825, not significant.

($r_s = 0,825$, $N = 5$, NS).

(c) Schuell's and expressive language test scores?

The same statistical test showed a correlation of 0.825, not significant.

($r_s = 0,825$, $N = 5$, NS).

COMPARISON OF RESULTS OF THE THREE TESTS WITH COMMUNICATION SCORE

1. Is there a general similarity or concordance between the three sets of scores as well as those on communication, i.e. between the four sets of scores?

The Kendall coefficient of concordance (W) showed that there was a significant concordance between the four sets of scores. ($W = 0,8625$, $S = 138$, $p 0,01$).

2. Is there direct correlation between the group's communication scores and their mean scores for the other three tests combined?

The Spearman rank correlation coefficient r_s showed a significant correlation of 0.90 between the communication scores and the combined tests scores. ($r_s = 0,90$, $N = 5$, $p 0,05$).

3. Is there direct correlation between the group's communication scores and their scores on:

(a) Luria test?

The Spearman rank correlation coefficient (r_s) showed a correlation of 0.25 which proved not to be significant with only five subjects ($r_s = 0,25$, $N = 5$, NS).

(b) Schuell's test?

The same statistical test showed a correlation of 0.825 not significant. ($r_s = 0,825$, $N = 5$, NS).

(c) Expressive Language Test?

The same statistical test showed a correlation of 0.800 not significant. ($r_s = 0,800$, $N = 5$, NS).

ANALYSIS OF THE THREE TESTS FOR THE MOST RELIABLE ITEMS:

Inter-item comparison revealed the following items as indicators of the greatest degree of difference amongst subjects.

Tests ranked in *nine out of ten* comparisons:

- (1) Test of the grammatic system indicated greatest difference amongst subjects – Luria's Test

Ss	M.T.D.D.A.	LURIA'S TESTS	EXPRESSIVE LANG.	COMMUNICATION SCORE
1.	70%	65%	65%	78%
2.	70%	65%	85%	90%
3.	68%	55%	76%	72%
4.	38%	30%	8%	8%
5.	89%	92%	86%	84%

TABLE II. Summary of results of performance of subjects on each of the tests.

Tests ranked in *eight out of ten* comparisons:

- | | |
|---|--------------|
| (2) The Preliminary Conversation – | Luria's Test |
| (3) Phonetic Analysis and Synthesis – | Luria's Test |
| (4) Phonemic Hearing – | Luria's Test |
| (5) Automatic Speech – | Luria's Test |
| (6) Predicative Function of Speech – | Luria's Test |
| (7) Comprehension of Number Structure – | Luria's Test |
| (8) Arithmetic Operations – | Luria's Test |

Tests ranked in *seven out of ten* comparisons:

- | | |
|---|----------------|
| (9) Imitative Speech – | Luria's Test |
| (10) Nominative Function of Speech – | Luria's Test |
| (11) Intellectual Functions – | Luria's Test |
| (12) Disturbance in Numerical Relations – | Schuell's Test |

Tests ranked in *six out of ten* comparisons:

- | | |
|---------------------------|-----------------------|
| (13) Word Comprehension – | Luria's Test |
| (14) Syntactic ability – | Psycholinguistic Test |

DISCUSSION

COMPARISON OF THE THREE TESTS OF APHASIA:

Results indicate that whereas the tests administered in this study measured different aspects of language breakdown, there was no significant difference in the 'amount' of aphasia as revealed by each test.

The significant concordance score verified this by indicating that if a subject performed well on one test, he also performed well on the other tests.

Inter-test correlations revealed that in spite of different theoretical stand-points, the M.T.D.D.A. and Luria's Tests showed a perfect correlation. They were equally reliable in predicting 'amount' of aphasic impairment. Correlations between expressive language and each of the other two tests, were both high, although not significant for the small sample. However, the experimenter still feels that it is valid to infer that expressive language ability is reflected in the performance of the other two tests. These correlations may indicate that the contents of the M.T.D.D.A. and Luria's tests are more similar. Thus the difference in correlation could be explained in terms of 'what' is being tested.

This study indicates the importance of both reauditorisation and higher mental functions in the re-acquisition of language, as well as the importance of retrieval and application of the rules of the language. The findings imply that there is a certain element which causes language breakdown in aphasia. It may be regarded as a particular function or a link in a system of functions. However, this element can be quantitatively measured in different ways by the different tests of aphasia. The manifestations as revealed by the various test items may differ, but the central disturbance is consistent.

COMPARISON OF THE THREE TESTS AND COMMUNICATIVE SUCCESS:

'Amount' of aphasia as measured on the tests was shown to concur with 'amount' of communicative impairment, when subjects attempted to convey a message concerning a particular stimulus picture. Assuming that this is reflective of general communicative ability, the speech pathologist may refer to the score obtained by the patient on a test of aphasia as a reliable indication of the degree to which communication is impaired.

The experimenter feels that while significant scores may be obtained for communications expressing simple needs or ideas, as the degree of abstraction and complexity is increased, communicative ability of the aphasic would decrease. Thus communication at a high level of abstraction would not reflect this high correlation between test performance and communicative ability.

However, considering the qualitative continuum of communication, the patient's communicative status may be indicated by the type of sentence he uses. The form of communication he is attempting may be regarded as the aphasic impairment and his ability to convey the message at his own level, as the communication impairment. As previously discussed one may be considered as a product of intellectual ability and the other a product of linguistic ability, although it is always difficult to clearly differentiate between them.

ANALYSIS OF THE THREE TESTS FOR THE MOST RELIABLE ITEMS:

The majority of items from the entire battery were those derived from Luria's test items directly related to language and to auditorisation of sounds, e.g. analysis and synthesis of words and sounds, and phonemic hearing – differentiation amongst sounds and words. Auditorisation is implicit in Schuell's approach. This supports previous statements validating both theoretical

approaches in diagnosis and treatment of aphasia, and emphasises that the approaches are not mutually exclusive.

Luria's test of the grammatical system, from his tests of expressive language, was revealed to be most indicative of aphasic difference, i.e. it is the best diagnostic tool. This gives support to the psycholinguistic approach to the study of aphasia, of which syntactic performance was ranked as being the most significant of the three psycholinguistic aspects of language. Thus ability to apply the rules of the language in both expression and reception, play an important part in a qualitative description of aphasic impairment.

INTER- AND INTRA- SUBJECT COMPARISON OF PERFORMANCE:

Analysis of the performance of each subject on the tests on a subjective basis, has lead to some interesting findings:

A comparison of Subjects 1 and 2 shows that their performance on the M.T.D.D.A. and Luria's tests was similar, but differed considerably in language performance and communicative ability. Their levels of higher mental functioning were similar, auditorisation and superimposed perceptual functioning were similar, yet expressive language ability differed considerably. This may be explained in terms of the differing ability to retrieve the rules of the language which supports the psycholinguistic approach to the study of aphasia. It may also be explained in terms of different neurological impairment in the two subjects.

A comparison of the performance of Subjects 3 and 5 gives rise to different implications about higher mental functioning. For Subject 3 the score obtained on Luria's tests was the lowest, whereas for Subject 5 the score was highest. The influences of premorbid status must be considered as a factor here. Although Subject 5's communication score was better than that of Subject 3, both scores indicated adequate communication on the level that was tested in this study.

This indicates that higher mental functionings may not in fact be of such great importance, but with a sample of two subjects, no real conclusions can be drawn. Once again, localisation of the lesion may be the crucial factor here. This may be explained in terms of Luria's theory by postulating that different systems within the brain were disturbed.

Although Subject 4 could perform certain tasks underlying language as tested on Luria's tests and the M.T.D.D.A., his expressive language was extremely poor. His performance was similar to that of Subject 5, in that they both scored lower on the language test and higher on the traditional tests of aphasia. This supports the idea that there are, in fact, certain skills underlying language, or certain mental activities basic to language which create the foundations of language expression and reception.

Subjective analysis of the results has indicated that scores obtained on the tests of expressive language were most similar, to scores of communicative success in four out of five subjects. This stresses the importance of a psycholinguistic test in evaluating aphasia,

IMPLICATIONS FOR DIAGNOSIS AND THERAPY:

It is a well accepted fact that accurate diagnosis provides the basis to successful therapy.

Test results reveal a perfect correlation between M.T.D.D.A., and Luria's tests. The tests rate equally in their measurement of aphasic impairment with regard to language. The experimenter thus feels that in order to make a full diagnosis of aphasia, the speech pathologist should select either the M.T.D.D.A., or Luria's tests and combine this with a psycholinguistic analysis of expression and comprehension.

Whereas a previous study⁶ has shown that clinical tests are less sensitive than linguistic tests, the results of this study seem to contradict this. The critical element lies in the fact that the subject on which the study was based had minimal language problems. The subjects in this study all had obvious difficulty in language performance. This indicates the relevance of psycholinguistic tests in the final stages of re-acquisition of language.

Aphasic therapy may be approached from all three different standpoints. The experimenter postulates an eclectic approach to therapy, in which principles of all three approaches are combined. For example, rules of the language may be taught through auditory repetition of examples involving that rule, which includes the basic principle of reauditorisation. In the same way the speech pathologist can help the patient reacquire higher mental functions. Mental functions such as memory, can be considered in terms of teaching linguistic units within the limits of the patient's memory span.

CONCLUSION

The experimenter agrees with Goldstein's⁹ conclusion that "Aphasia is no disease, no isolated complex, but it is a functional disturbance of the complex structure of language within the totality of Man's capacities and behaviour."

In spite of the small sample of subjects, the lack of standardised items for Luria's tests, and the subjective analysis of the test items, the study did serve to highlight certain aspects of aphasia. There appears to be a certain element in aphasia which can be measured successfully by the three tests used in the study. Aphasia has been considered as causing a defect in communication thus the urgent need to relearn language is directly related to the need to communicate. Therefore an efficient mode of diagnosis is essential. Basic to a true understanding of the problem of aphasia is an awareness on the part of the speech pathologist as to how great a problem the language impairment really is to the aphasic patient.

REFERENCES

1. Critchley, M. (1970): *Aphasiology and Other Aspects of Language*. Edward Arnold, London.
2. Luria, A.R. (1966): *Higher Cortical Functions in Man*. Tavistock Publications, London.

3. MacMahon, M.K.C. (1972): Modern Linguistics and Aphasia. *British Journal of Disorders of Communic.*, 7, 1, 54-63.
4. McNeill, D. (1966): Developmental Psycholinguistics. In *The Genesis of Language*, Smith, F., and Miller, G.A. (Eds.). M.I.T. Press.
5. Osgood, C.E. and Miron, M.S. (1966): *Approaches to the Study of Aphasia*. University of Minnesota Press.
6. Penn, C. (1972): A Linguistic Approach to the Detection of Minimal Language Dysfunction. Unpublished Research Report, University of the Witwatersrand, Johannesburg. (Published in this issue of the *J.S.A. Speech Hearing Assoc.*)
7. Schuell, H. (1953): Auditory Impairment in Aphasia: Significance and Retraining Techniques. *J.S.H.D.*, 18, 1, 14-21.
8. Schuell, H., Jenkins, J.J., Jiménez-Pabón, E. (1964): *Aphasia in Adults*. Harper & Row, New York.
9. Taylor, O.L. (1965): A Measurement of Functional Communication in Aphasia. *Archives of Physical Med. and Rehabilitation*. 46, 101-107.
10. Tikofsky, R.S. (1966): Language Problems in Adults. In *Speech Pathology*. Eds. Rieber, R.W. and Brubaker, R.S. Chap 11. Northern Holland Company, Amsterdam.
11. Wilson, M.E. (1969): A Standardized Method of Obtaining a Spoken Language Sample. *J.S.H.R.* 12, 95-102.