

THE EFFECT OF THERAPY, GIVEN IN ANOTHER LANGUAGE,
ON THE HOME LANGUAGE OF THE BILINGUAL OR POLYGLOT
ADULT APPASIC

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by

Marion Fredman

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D e c l a r a t i o n

I hereby declare that this dissertation represents my own independent work and has not been submitted as a dissertation for a Master's degree at any other University.

Signed.

Maxon Freeman

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PART ONE

CHAPTER I

INTRODUCTION

Aphasia is a complex language disturbance which presents a challenge to the patient and those treating him. The normal person takes for granted his ability to "... communicate in a smooth flow of speech." When this ability is disturbed it is a major catastrophe to the person affected and those close to him [31 p.1].

The bilingual or polyglot aphasic patient has for many years provided additional interest and problems for workers in the field of aphasic treatment and research. Up until the present this interest has centered around the language which the patient is likely to recover first. Several theories have been propounded and evidence presented in support of each. After working with polyglot aphasics for some years this writer became interested in a different aspect of the problem. It was no longer of great importance which language would return first because the patient having treatment was only in a position to be taught in the language spoken by the therapist. As the work was done in Israel the language spoken was Hebrew.

It began to be of interest and practical importance whether or not therapy in a secondary language was helping the patient to recover the language spoken at home. The question arose as to whether or not therapy in Hebrew was being a hindrance or a help. If the former was true, then maybe these patients should be left alone to recover spontaneously whatever

language they are able to recover alone. If therapy was a help, then to what extent did it influence the patient's primary or home language?

Examples have been reported in the literature of patients being taught in countries other than their country of birth, after sustaining war injuries or accidents, and learning a foreign language which was unknown to them prior to illness [31 p.36]. In the experience of this writer the same has proved to be the case amongst adult aphasic patients in Israel.

This country has a policy of encouraging and integrating new immigrants from all over the world. As a result of this, the majority of the population speak two or more languages. It is thus an ideal country for the study of bilingualism and polyglottism. Because these patients are at present resident in Israel, it is important for them to have therapy in a language other than their mother tongue, as therapists cannot be found who are able to speak the many languages common among the immigrant communities. After the writer had worked with more than 25 patients over a period of five years in hospitals in Haifa, Israel, it was observed that 20 of these patients had not spoken Hebrew as their home language prior to illness. No qualitative data had been collected on the improvement made by these patients, but the impression gained was that where improvement was made in Hebrew, it was made in other languages as well.

It was thus with these observations in mind that the writer devised the Aphasia Research Project (A.R.P.) which was funded by a research grant from the Bureau of Disease Prevention and Environmental Control of the United States Government. The main aim of this project was to test patients before and after three months treatment and determine the effect of therapy in Hebrew on their home language. The second aim was to translate and adapt the

Wepman and Lyle "Language Modality Test of Aphasia" (L.M.T.A.) [60] into the Hebrew language.

While planning the A.R.P. this writer felt that she would like to use her work as a basis for a Masters dissertation. As Bar-David [5] was responsible for the translation and adaptation of the L.M.T.A. it was considered more suitable to use an independent aphasic test for this dissertation, and utilise the L.M.T.A. results as a control. The writer thus decided to translate the Sklar Aphasia Scale (SAS) [44] into Hebrew and to use this test as an independent means of measuring the patients' difficulties. The SAS results were only used for the purpose of this dissertation and not for the A.R.P. It was also decided that 20 patients would be the sample for this study whereas the A.R.P. was planned to test and treat 40-50 patients.

This present study is thus based on the work planned and carried out by this writer for the A.R.P. with an additional diagnostic test, the Sklar Aphasic Scale [44], being used to add another aspect to the original study.

In studying a bilingual and polyglot aphasic patient, the fact of his aphasic condition is of first importance and any study of these patients involves a preliminary analysis and understanding of aphasia. From the earliest times in the study of aphasia attempts have been made to label the patient and to classify aphasics either in terms of the localization of their brain damage or, in more modern times, in accordance with the symptoms presented. It is suggested by this writer that a more fruitful approach is one in which the remaining abilities of the patient could be described, in such a way that other workers in the field will be able to understand the evaluation of the patient, without necessarily knowing the implications of such terms as e.g. Wepman's pragmatic aphasia or Jakobson's "contiguity disturbances".

Likewise no one therapeutic approach or technique has been used in the study on which this dissertation is based. Therapy leads were given by the test results obtained on each patient and several theoretical sources drawn upon in planning each individual therapy programme.

The purpose of this study is to determine the effect of therapy in Hebrew on the patient's home language. It is hypothesized that there will be a positive carry-over effect into the home language, and that because of the processes stimulated during the period of therapy, it is of value to treat even those patients whose knowledge of the Hebrew language was poor prior to illness. It is assumed that a process as such is stimulated, and not just the ability to understand and speak one particular language. From this assumption it is predicted that there will be an improvement in all languages spoken previously by the patient, and that therapy in Hebrew, which was not the primary language prior to illness, will nevertheless help to improve speech in the primary language.

Definitions

1. Aphasia has been defined by Taylor [46] as an "acquired impairment of verbal behaviour caused by brain damage which impedes the linguistic features involved in encoding or decoding language."

Aphasia has also been considered as "a general language deficit that crosses all languages modalities and may or may not be complicated by other sequelae of brain damage," and impairment of auditory, visual and sensori-motor processes [37 p 113].

A further definition describes aphasia as "a nonfunctional impairment in the reception, manipulation and/or expression of symbolic content whose basis is to be found in organic damage to relatively central brain structures" [31 p.8].

Aphasia may also be defined as "a disturbance or loss in the ability to receive, analyse and express language signs or symbols" Sklar [44]. This definition is used for the purpose of the present study, as the writer finds it concise and adequately descriptive of the disorder to be discussed.

2. The term bilingual or polyglot aphasic will be used constantly in later chapters. Bilingual is defined as a person speaking two languages equally well [11 p.119]. Two types of bilinguals are described by Osgood and Ervin [31 p.135] namely "compound" and "coordinate." The former has learnt two codes or systems of signs more or less as translation equivalents and the latter has learnt his codes under different circumstances, e.g. one as a child and the other as an adult or one at home and the other at work "... compound and coordinate define the extremes of a continuum along which bilinguals will range." No bilinguals of the compound type have been included in this study.

For the purposes of the present study bilingualism may be defined as the speaking of two languages (one possibly more fluently than the other) and having learnt the two under different circumstances as described above in coordinate bilingualism. Polyglots can thus be defined as individuals speaking more than two languages with varying degrees of fluency.

The term polyglot, which comes from the Greek words "poly" meaning many and "glotta" meaning tongue, refers to the individual speaking several languages. This term may be more applicable to the Israeli population than

bilingual as most of the immigrants from Europe speak at least three languages with various degrees of fluency.

This dissertation has been divided into two parts. Part One provides a review of theoretic concepts, and in Part Two the practical aspects of the study are described in detail.

In Chapter II modern theories of aphasia will be presented with the emphasis on psycholinguistic theories. Various models and classifications will be discussed.

Chapter III presents a background to bilingualism and aphasia. The acquisition of language in the normal bilingual person is discussed and the special difficulties facing the bilingual or polyglot who acquire aphasia emphasised. Chapter IV attempts to review current trends in aphasic therapy and to develop a philosophy of therapy which will guide the therapy programmes used in this study.

Chapter V discusses the background to the construction of tests for use with adult aphasic patients and gives the rationale supporting the choice of assessment instruments for this particular study.

Chapter VI outlines the preliminary steps taken to prepare and organise the study.

Chapter VII summarises the case histories and therapeutic programme of each patient treated.

Chapter VIII provides a detailed discussion of results obtained before and after therapy.

Chapter IX discusses the conclusions reached in this study.

An Appendix is added which will include the Sklar Aphasic Scale in Hebrew, the pamphlet to aid the family of the patient and the Home Language Questionnaire.

In this dissertation spelling will be Standard English unless contained in a direct quote. Reference numbers will be followed by page numbers when the reference refers to a book. When the reference is to a journal article, the pages numbers are provided in the bibliography.

CHAPTER II

MODERN APHASIA THEORY

A. Brief Historical Perspective

In any consideration of aphasiology mention must be made of the predecessors to modern theory. In reviewing the literature it is possible to group the various writers according to schools of thought.

The first school of thought attempts to localise the site of the lesion causing the aphasic disturbance. Later a reaction developed to this type of thinking and an effort was made to study the aphasic from the standpoint of his speech and thought disturbances. Increased and more systematic observations led to the development of tests which in turn helped in the advancement of therapeutic techniques.

The very early and primitive idea of brain function was as something separated from the human body. Neurological disease or disturbances were thought of as coming from the outside world or as an evil spirit entering the brain [37 p.11].

The first important contributions to the constructive study of aphasia were made in the 19th century when we have the concept of central representation of speech being presented by Broca. The publication of Broca's paper entitled "Sur la faculte du langage articule" in 1861 and further papers which appeared between 1861-1865 [15 p.39], focused the emphasis of the problem on the precise cerebral localization of the centres of speech. Basing his

observations on post mortem findings, Broca expressed the view that articulated speech is localized in the posterior third of the inferior frontal convolution of the left hemisphere.

The works of Charles Wernicke [31 p.2], further broadened the scope of aphasic study by attempting to locate the problem of the sensory aphasic whose main symptom is impaired comprehension of speech sounds. Wernicke believed that these patients had lesions in the first and second temporal convolutions. Wernicke was the first to attempt to draw up a diagrammatic scheme to analyse aphasia and he introduced a period to be known as the "diagram makers."

Following on Wernicke's work, several investigators described lesions in one small part of the brain as causing a disturbance of mainly one form of mental activity. These ideas were acceptable because of the prevailing propositions of contemporary psychology and progress in anatomy and physiology [36 p.12]. The diagram makers were criticised on the basis of lacking sufficient data and theory.

In the 1860's a reaction to narrow localization developed. Hughlings Jackson [56 p.35] formulated a new theory which negated the value of diagram making and mapping of faculties. Jackson believed that it was the ability to "propositionize" that was lost in the aphasic and not just words.

Sigmund Freud [31 p.2] was influenced by the writings of Jackson, and in 1891 wrote a critical analysis of localization in relation to aphasia. He pointed out that language performances should be thought of as complex processes involving many regions, rather than as memories stored away in particular cells. Freud is believed to have been far in advance of his time in his thinking on aphasia.

The period between World Wars I and II is characterised by an improvement in the methods of studying aphasics and the compilation of tests to better diagnose the condition. Sir Henry Head [37 p.33], as director of a hospital for brain injuries in England, devised a series of tests and systematically gave them to a fairly large sample of patients. Head came to the conclusion that in aphasia it was not a general intellectual ability which was affected, but rather a specific mechanism which is language.

Yet another advance was made by Kurt Goldstein [37 p.38] whose careful clinical observations lead to the formulation of concepts which are considered valid until today. For example, he found that the aphasic patient exhibits a rise in threshold and retardation of excitation which reduces his receptivity and lengthens his reaction time. Another observation made by Goldstein was that there was an impairment of abstract thinking. Goldstein's ideas on testing made great strides forward in the history of aphasia theory. He opposed quantification in testing but believed that tests should be constructed in such a way that observations of how a patient obtains the results may be made. The Goldstein and Sheerer [37 p.38] test of 1941 attempted to test the abstract and concrete behaviour of aphasic patients.

The emphasis had now shifted to more careful clinical observations and studies of the aphasic condition as part of human behaviour. Weisenberg and McBride [37 p.42] carried out a five year study of aphasia in 1935. Advances were made in methodology which Schuell [37 p.42] considered as their most important contribution to the study of aphasia. They were the first investigators to use a normal control group and use standardized measurements.

Weisenberg and McBride and Head were not strict localizationists although they conceded that some parts of the brain probably carry out certain

functions more than others, but Nielsen (1936-1953) believed that the doctrine of cerebral localization had been discarded too soon [37 p.48]. He was a strict localizationist and described specific areas and specific dysfunctions which he believed were caused by lesions in these areas.

The opposition schools of localizationism and anti-localizationism have each made their contribution to the study of aphasia and to the advancement of scientific ideas regarding the brain and its activity.

B. Modern Theories of Aphasia

Much progress has been made in the study of aphasia since World War II. New schools of thought have developed in the Western world and the U.S.S.R. and in more recent times the Russian texts have been translated, enabling the English speaking world to benefit from their research.

When discussing theories of aphasia, it is hard to draw the line between the testing of aphasia and the resultant theories of aphasic impairment which emerge and therapy. Much of the literature describes how investigators have formulated theories as a result of their experiences in testing or treating aphasic patients. An attempt will be made in this study to distinguish between the three separate elements in studying the aphasic patient. Firstly, a purely theoretical background to modern concepts of aphasic impairment which will be presented in this chapter. Secondly, a background to testing and thirdly, a philosophy of therapy which will be described in later chapters.

In this section the writer proposes to highlight some significant developments in neurological theories and psycholinguistic theories which have affected modern thinking on aphasia.

The most significant development since World War II is the co-operation between the various sciences in the study of aphasia and the progress in psycholinguistics, which aids our understanding of the problem. The new neurological theories of the working of the nervous system and brain also throw a brighter light on our understanding of what is involved in an aphasic impairment.

Because of the uniqueness of language to the human species only, we do not have the advantages of being able to study language behaviour by experimental surgical methods on lower animals. Information is obtained by 1) autopsy results being correlated with clinical evidence, for example as described by Sklar [43], 2) the induction of temporary aphasia by injection of sedative drugs through the carotid artery [32 p.86], and 3) electrical stimulation of the cortex. The latter method was described by Penfield and Roberts in 1959 [32 p.136]. These investigators were able, by stimulating various parts of the cortex with electric current, to produce slurring, arrest of speech, other speech difficulties and difficulties in reading and writing.

Penfield and Roberts [32 p.134] further reported "area-localization and not a point-localization " They did not find differences, as to speech disturbance, when each of the three language zones in the left hemisphere was stimulated by electric current. They thus concluded that the three zones act as one system and an electrical disturbance in any part of the system may disrupt the whole system. They are in favour of removing damaged areas in order to give the patient a better chance of recovering language. Penfield and Roberts [32 p.19] conclude that the following areas are important for speech in this order "... the posterior temporo-parietal, Broca's and the supplementary motor areas."

In a study done by A. Hecaen and R. Angelergues in Paris [18], a detailed description was given of the symptoms found in aphasic patients with an attempt to find the exact localization of the lesion in the brain. They were helped in their study by postmortem examinations or by surgery. The conclusions drawn here too were that it is more profitable to concentrate our attentions on a broad view of a functional zone rather than on a narrow localizationist viewpoint. They do, however, point out that one area appears to be truly central, i.e. the area traditionally known as Wernicke's area and they found that destruction of this area leads to alteration of all language modalities, even motor elements.

Attempts have been made by certain investigators to try to pin-point small areas of the brain and establish which special function could be localized in this area, e.g. Dr. Nielsen proposes that Wernicke's area is the locus of recognition of the sounds of words, the angular gyrus for visual verbal recognition [31 p.48]. If definite areas were responsible for specific functions A.R. Luria [25 p.13] believes that with the destruction of these areas such functions would be lost, and this has proved to be untrue. He states that "the lesion of a circumscribed area of the cortex almost never causes the loss of a single isolated function but rather a "syndrome" or "symptom complex".

An analysis of the Russian literature recently translated reveals the adherence of the writers to the work of Pavlov in their explanations of the functioning of the cerebral cortex. Tkachev [49] quotes the theories of Pavlov concerning the second signaling system, which is directly connected with the first signaling system and which he believes must be widely localized in the cerebral cortex. Pavlov took into consideration data which indicated that various forms of aphasia are associated with injury to different parts

of the brain. The demarcation between the signaling systems is, as quoted by Tkachev, a matter of functional nature and not anatomical.

Luria [22] believes that the separate regions of the cortex form complicated systems for the analysis of visual, auditory, kinesthetic and motor stimuli. Separate regions of the cerebral cortex form the most complicated apparatus for specific forms of analysis and synthesis of "exteroceptive" and "proprioceptive" stimuli. These were called by Pavlov the "cortical analyser terminals". Under normal circumstances these analysers function very effectively but destruction of the brain tissue or breakdown in the blood supply alter the conditions of its functioning, and reduce the strength of the nervous processes within the limits of the given functional system. The normal function of the "analyser" is disturbed, and the process of analysis and synthesis within the limits of the modality with which the particular cortical system is concerned acquires a pathological character. This disturbance of normal processes within the limits of a given functional system, e.g. auditory, is "a direct primary result of every focal lesion of the cortex" [22]. This effect, however, never remains isolated. A secondary or systemic effect of the given lesion is experienced in the complicated systems of temporal connections which control forms of adaptive activity in human beings such as speech, writing or reading, counting or the solution of cognitive problems. These secondary effects of the disturbance of the normal action of a given analyser include symptoms of aphasia, agnosia or apraxia.

Osgood and Miron [31 p. 60] quote Luria as saying that "the time when researchers could talk about special 'centers' for complex functions like pronunciation, syntax or semantics is irrevocably gone". He advises one "not to think of the primary effect of any focal lesion as disturbing the function of some analyser ... which is responsible for the differentiation

and synthesis of information in its modality," and furthermore to seek for "... nonchance contingencies among symptoms across patients ... and relate such syndromes to loci of lesions" [31 p.61]. This is preferable to trying to associate isolated symptoms with precise brain locations.

Certain important aspects of modern theory of aphasia will be discussed below. They are theories of functioning of the association areas, cerebral dominance, psycholinguistic theories of aphasia and classifications of the aphasic disturbance.

1) Association Areas

The "association" areas have always been of special interest in the study of aphasia because it has been presumed that "... associative rather than purely sensory or motor processes are involved in language behaviour" [31 p.40]. Experiments have been done on monkeys which show that the posterior association areas are modality specific but the frontal association areas are non-specific. The former finding has not been proved in man. The purpose of the posterior association area appears to be to refine sensory-motor functions, whereas the frontal association area is "... neurologically in intimate relation with the internal core systems" and functions in a manner which facilitates "modifiability" behaviour connected with fighting, fleeing, feeding, maternal and mating performances [31 p.40].

It appears that many lesions producing aphasia in man are in the primary auditory cortex rather than in the association cortex. The ability to master difficult and complex tasks in monkey's is reduced by a lesion in the posterior temporal lobe, i.e. auditory association cortex. Some of the symptoms found in aphasia are similar in nature and complexity to these tasks. Because there is nearly always a difficulty in auditory discrimination of complex

words or constructions in aphasia, it may be considered as "... primarily a disturbance in the auditory mode" [31 p.41].

How does the posterior association cortex interact with the primary sensory regions? Dr. Karl H. Pribram [31 p.41] of Stanford University believes that "... the sensory systems actually have efferent as well as afferent fiber connections, that is input-output mechanisms, functioning within the projection systems". Through a process of learning, programs are built up in the association areas which when activated operate back on the sensory cortical areas. The inputs to these association areas are not considered to be "modality specific" but their outputs into the "... primary sensory projection systems are modality specific" [31 p.42]. The evidence is not so clear as regards motor activities. The precentral or "motor" cortex as it was known classically, "... has direct afferent as well as efferent connections with the periphery" [31 p.42]. Thus there appears to be an input-output system which functions to integrate, organise and refine movements, but the evidence is not conclusive.

There is also very little information on how the nervous system codes the incoming data. But it is known that "... the classic notion of point-for-point projection from receptors to brain, via one-to one-correspondence between links within neural chains is erroneous" [31 p.42]. The nervous system is viewed by Lashley [31 p.43] as acting as a whole. He believes that a given fiber in the central system is capable of carrying information from any receptor at any time. Although it may be true that some nerve fibers carry information from one receptor more than from others. Osgood [31 p.43] states that this idea of the functioning of the nervous system is perhaps most applicable to the association areas.

2) Cerebral Dominance and Laterality

Osgood and Miron believe that there now seems to be no question that there is localization of language functions in the sense that one hemisphere, usually the left, is dominant. There appears to be, however, evidence of some replication of function, either between the two hemispheres or between regions of the dominant hemisphere, which would explain spontaneous recovery [31 p.49].

One of the oldest approaches to speech was through cerebral dominance. At first handedness as an index of cerebral dominance or its relationship to speech was not considered. It was later theorised that a person being right handed, speech must be localized in the left hemisphere and it was assumed that in a left handed person speech would be localized in the right cerebral hemisphere. With the exception of individuals who incur left cerebral damage early in life, the left cerebral hemisphere is usually dominant for speech, regardless of handedness, according to Roberts [33]. Therefore it seems to him that the most important thing man inherits is a left cerebral hemisphere dominant for speech, and it is possible that right handedness may have developed secondarily to speech dominance.

This view is supported by other writers. Dr. Teuber [29] in a discussion at the CIBA Conference on Cerebral Dominance states that handedness is not a reliable marker of speech dominance. A preference for the left hand does not predict what will happen if one hemisphere is destroyed. Penfield and Roberts [29] concluded that the left hemisphere is dominant for speech in most people with handedness of questionable relevance. Osgood and Miron [31 p.51] state that there are strong and independent tendencies for humans to be right handed and to develop speech organisation or dominance in the left hemisphere of the brain. Thus most aphasics are right handed and also develop their language

disturbances as a result of a lesion in the left hemisphere.

3) Psycholinguistic Approaches to Aphasia

As previously mentioned the study of linguistics, and more especially psycholinguistics, has changed the approach to aphasia considerably in recent years. The terminology used in psycholinguistics makes for a clearer description of an aphasic patient's difficulties and is an invaluable aid in the diagnosis and treatment of the aphasic patient's language disability. Psycholinguistics has been defined as the "... investigation of the relationships among producers of messages, messages, and receivers of messages" [31 p.150]. It is thus concerned with the encoding and decoding aspects of message production, reception and analysis. This writer feels that such an approach is the most realistic for the speech pathologist faced with the rehabilitation of an aphasic patient, and should thus provide the basis for both testing and treatment.

No extensive, strictly linguistic type of approach to defining aphasia has yet been devised. Most authors use a loose classification into types by "a linguist" either with or without the use of a preselected classification, and then try to relate these types to traditional clinical types or theoretical types as proposed by linguists like Jakobson [45]. Spreen [45] does not believe that a "... discriminant function analysis of linguistic data between traditionally defined clinical groups is likely to produce new ideas for classifying aphasia nor evidence to validate old classification." He would like to see a complete departure from older concepts and a fresh look at the patient on the basis of purely empirical linguistic data, and adds that to date, Jones' and Herman's list of measures is the most comprehensive

Dr. Paul L. Garvin [16], at a Conference at U.C.L.A., comments on what the linguists and non-linguists, i.e. brain researchers and clinicians, can offer to each other. In his opinion, the main contribution of the linguists is to provide a frame of reference and the contribution of the non-linguists is to provide "a link to the physiological substratum of language and a means of validation."

One of the comments made by Geschwind [16] during the conference was that language functions as a cross-modal sign system. The only aspect of this view which has interested linguists has been the problem of "synesthesia" in relation to speech sounds. It may be worthwhile, stated Garvin [16], for linguists to go beyond such limited observations and consider this cross-modal function more systematically.

Dr. Roman Jakobson, at the same conference mentioned above, spoke of the two different factors which play an essential role in any speech event, namely, the selection of the right word to be used and the combination of the two selected verbal entities. The first factor is based on an internal relation whereas the second involves the external relation to contiguity in various forms and degrees, e.g. neighbourhood proximity, remoteness, etc. [20 p.68]. It is Jakobson's opinion that in an aphasic patient, we have a breakdown either of the selective ability or the capacity of combination.

Jakobson further points out that the traditional discrimination between two types of aphasia which were known as "sensory" and "motor", is very misleading, creating the erroneous impression that the entire problem lay either in the damaged articulatory motor activities or in the harmed sensory apparatus. The misunderstanding disappears as soon as the term "encoding" is substituted for "motor" and "decoding" for "sensory".

An interesting theory applied to the aphasic patient is that of microgenesis or language generation. The theory of Arnold Pick which he propounded in a monograph written in 1913 [45], suggests, amongst other things, that the choice of words for making an utterance itself is only the final step in producing language. He asserted that most patients know fairly well what they are going to say and errors occur at the last stage of language production. Spreen comments that "these errors are closely related to the intended words and are often caused by a lack of inhibition or of resistance towards incorrect choices." [45]

Following on this theory, other workers in the field developed the concept of a "pregestalt arrest of language" in aphasia. Werner [45] suggested that the process of generating language is interrupted for other reasons before it reaches the final gestalt. Spreen [45] quotes studies done by Werner, wherein the latter gives examples of patients producing "atmospheric" impressions which "... precede the specific, correct articulation of the text." If a patient sees the word "green" and reads it as "blue" he has already grasped the concept of colour.

Spreen [45] writes of the microgenetic regression hypothesis as predicting that words with high associative meaning tend to be more easily substituted than others. He quotes Howes' explanation for this; namely that even normal speakers use abstract words less frequently than concrete ones. As aphasics use rare words less frequently than familiar ones, abstract words are more easily affected than concrete ones.

4) Classifying the Aphasic Disturbance

Various authors have attempted to classify different types of aphasia or formulate models to classify aphasic disorders based on their own interpretation

of the linguistic disturbance involved.

Jakobson [20] believes that the works of Luria are the most instructive in the study of aphasia. Firstly, "... because he approaches the different types of aphasic impairments on several levels," and also because of the opportunity given to him to work with such a large number of aphasic patients in Moscow.

With the works of Luria and Jakobson attempts were made by other investigators such as Nepman to classify aphasia from a linguistic point of view. This represents an advance on the older type of classification. The classifications of the above mentioned writers and that of Schuell [37] will be presented below.

1. Luria [24]

a) Sensory aphasia is a type of disturbance of the analysis and synthesis of speech sounds. Because of the disintegration of phonemic hearing which is present, naming is difficult and even giving a hint of the initial sound of the word does not help the patient. He finds it more difficult to point to an object when he is provided with a choice of words such as: "show me your eye and your nose ...".

b) Acoustic amnesic aphasia is also a selection disorder but the phonemic hearing remains relatively intact. In this type of disorder the patient finds difficulty when the amount of information is increased, e.g. if asked to repeat a number of similar syllables or to write three words similar in sound structure. These patients have a naming difficulty and are not helped by hinting the beginning of a word.

c) Afferent Motor Aphasia. If the post-central part of the cortex is impaired there exists what Luria terms as "disturbance of the articulum" which leads to a form of afferent or kinaesthetic motor aphasia. These patients have difficulty pronouncing words using a kinaesthetic foundation. They substitute sounds in writing which are similar in articulation, e.g. 'khalat' as 'khanat' in Russian.

d) Efferent Motor Aphasia (traditional Broca's Aphasia). This patient may have individual nouns but finds difficulty in combining words into sentences. At times he exhibits the well known symptoms of "telegraphic style" of speech. The ability to shift from one articulation to another is ~~very~~ ^{impaired} ~~difficult~~. The disturbance is also reflected in writing. Letters are rearranged or repeated and often they cannot write a syllable or word [26 p.208]

e) Semantic Aphasia. The patient has the acoustic structure of speech intact but is unable to grasp the difference in grammatical construction, e.g. 'father's brother' and 'brother's father'. He also has difficulty in interpreting complex construction which requires abstractions, e.g. 'less bright' is the same as 'dark'. Jakobson [20] quotes studies done in Polish by Doroszewski and difficulties experienced by aphasics speaking Czech or Hungarian where contrast of long and short vowels plays a great role in the language and is lost by the aphasic.

f) Dynamic Aphasia is described by Luria as belonging to the combination disorders but presents no disruption on the phonemic or grammatical level. The patient experiences difficulty when he attempts more than one sentence or when switching one system of signs to another, e.g. answering a verbal order with a prescribed gesture. There is a disturbance of inner speech present and an impairment of the regulation function of speech.

Luria's six types of aphasia have been analysed by Jakobson [20] who comments on three dichotomies which underlie these aphasic types as follows:

- 1) Combination which implies contiguity and affects mainly encoding versus selection which implies similarity and affects primarily decoding.
- 2) Successitivity versus simultaneity.
- 3) Disintegration versus limitation.

2. Jakobson [19,20]

Jakobson's contribution to the field of aphasiology lies in his linguistic approach to the problem. He believes that "... an intrinsically linguistic typology of aphasic impairments outlined without any regard to the anatomical data ..." gives us a pattern which proves to be "... remarkably near to the topography of those lesions of the brain which underlie these impairments." [20]

After considering the analyses of Luria and various European and American works combined with his own observations, Jakobson [20] presented a tentative topographic analogue showing what he considers is the close correspondence between the location of lesion and linguistic typology of impairments.

The combination (contiguity) disorders appear to be connected with the more anterior lesions of the cortex and the selection (similarity) disorders with the more posterior lesions. [20]

Dr. Norman Geschwind [20] criticised Jakobson's model in that it suggests that in association with fluent paraphasic speech there must be a disturbance

of comprehension and of repetition. Conversely, disturbance of comprehension is thought of necessity to entail a disturbance on the expressive side, but, argues Geschwind, we can find these elements varying independently. There are also many cases quoted in the literature of isolated comprehension disturbances, without an expressive or encoding side. When the decoding ability is destroyed, the encoding ability may still be preserved if it was strongly developed prior to the onset of the decoding disturbances, but usually such disturbances lead to a deterioration of encoding as well. "This seems to be a feasible assumption if one accepts that the active mastery of language implies its passive mastery." [20]

Jakobson [19] believes that those who view aphasia as a unitary general disorder with different types of aphasia "... representing differences in quantity of disturbance, rather than in quality ..." are committing a linguistic error.

The writer would like to quote Jakobson's explanation as to why the combination disturbances affect primarily the encoding activity of the patient, whereas the selection disturbances strike especially the decoding activity.

In the process of encoding, impairments affect the context rather than its constituents whereas the decoding process presents the reverse relation. The speaker makes the selection of elements before combining them into a whole. The building of context is a secondary stage and more susceptible to disruption. Therefore the encoding process succumbs most often to combination disturbances. [20]

In decoding we first have to grasp the whole and this is particularly vulnerable to the selection disturbances. Here lies the difference between speaker and listener. There are no homonyms for the speaker. "When he says 'bank' he knows perfectly whether he is speaking about the shore of a river

or a financial establishment . . ." but the listener if he is not helped by the context, struggles with homonymy [20].

There are no purely encoding or purely decoding disorders, only difference in hierarchy. There is much less dependency of decoding on encoding than vice versa. "More or less intact decoding processes are compatible with badly disrupted encoding" [20]. The sphere of our decoding is wider than our encoding activities.

3. Wepman

Wepman [20] reminds us that there is a level of language lower than the cortical one. The patient is often seen who can echo or repeat anything but has no spontaneous language of his own.

Although there is no ideal topographical relationship between the brain and language, the fact that it is even possible to suggest such a relation using behavioral data is important for it provides us at least with a take-off point discussing the issue from a linguistic point of view. [20]

To identify the linguistic disturbances in aphasia the semiotic classification as used by Charles Morris is found most suitable by Wepman [59]. Three basic properties of signs and their relationship to each other are suggested. They are: (a) "semantical", which is the relation of signs to objects or events; (b) "syntactical", the relation of signs to signs, and (c) "pragmatical", the relation of signs to interpreters. These three types of aphasia will be discussed below.

a) Semantic Aphasia

Wepman and Lyle [59] compare semantic aphasia to Jackson's proposition-alising but think it is even closer to "Luria's loss of the ability to communicate ideas" and to Jakobson's description of the "similarity" disorder in language usage. Such patients are described by Jakobson as having their words limited to the more frequently used words of the language. There is a retention of some grammatical form and function.

b) Syntactic Aphasia

In syntactic aphasia the ability to nominate, propositionalise, communicate ideas and decode may well be relatively intact. Grammar, both in use of words for grammatical purpose and in the form of inflectional endings, tense or gender, suffers most radically. Luria suggests that these are often "telegraphic" speakers. Jakobson speaks of the disorder as a loss of the ability to encode.

c) Pragmatic Aphasia

The pragmatic aphasia cannot maintain a working relationship between the stimuli he receives and his verbal efforts. Although there is some similarity to the semantic aphasic, their disability seems much more one of controlling their verbal efforts. This is comparable to Luria's description of the "breakdown of the regulatory functions of speech connections" [59]. There appears to be a breakdown of the ability to obtain meaning from a stimulus and use it as a basis for orderly symbol formulations.

Below the writer presents a table as suggested by Dr. Geschwind [59], in which he attempts to show the relationships and similarities between the types of aphasia described by the Classical writers, Wepman, Jakobson and Head.

Classical	Wepman	Jakobson	Head
Broca's Motor Expressive Anterior	Syntactic	Contiguity	Verbal
Posterior Wernicke's sensory	Pragmatic	Similarity	Syntactic
Anomic Amnesic Amnesic	Semantic	Similarity	Nominal

Wepman [59] does not agree with this table as he believes that his pragmatic aphasia is more similar to Luria's "regulatory dysfunction" and not Wernicke's sensory aphasia.

4. Schuell, Jenkins and Jimenez-Pabon

Schuell et al [37 p.188] believe that "A classification system is an attempt to abstract dimensions that are meaningful and useful in dealing with complex processes or events." It is important to know what is interfering with the patient's ability to communicate and what can be predicted about his future ability. The classification arrived at by Schuell and co-workers is based on recurring patterns of impairment. The five major categories used by Schuell et al are as follows:

Group I Simple Aphasia which is a reduction of available language in all modalities. No specific perceptual, sensori-motor or dysarthria components are present. (This writer is not in favour of the term "simple" as no aphasia really is simple).

- Group II Aphasia complicated by central involvement of visual processes.
- Group III Aphasia with severe reduction of language in all modalities complicated by sensori-motor involvement.
- Group IV Aphasia with some residual language preserved and usually with both dysarthria and visual involvement.
- Group V An irreversible aphasic syndrome with almost complete loss of functional language skills. [37 p.190]

One of the arguments that has arisen in modern aphasic theory is in answer to the question whether the disturbances in aphasia can be shown to distribute themselves along a single difficulty dimension, or whether there is evidence for several independent dimensions of disturbance. Schuell and Jenkins [31 p.124] approach the problem from the point of view of a single dimension of difficulty whereas Wepman and Jones [57] isolate input-output modality and translation factors and have drawn up a model illustrating their concept of aphasia. Their model shows "... input transmission leading to integration leading to output transmission." Both input and output are regarded as being modality bound, whereas although transmission has some modality linkage it is not bound by it. Aphasia is regarded as an integration disruption and is symbolic in nature. Agnosias and apraxias on the other hand are non-symbolic and are considered as transmissive disorders which respond well to direct therapy [57].

In contrast to this model, Schuell and Jenkins used test items on a large sample of aphasic patients and as a result they concluded that an unidimensionality of language deficit is present in aphasia. The test items which gave them these results were those which "... yielded a reproducibility coefficient of .96" and "... provided maximum spacing along the difficulty continuum." After cross validation of the 18-test battery gave an index of

.92, Schuell and Jenkins concluded that they had "... impressive evidence for unidimensionality of the language deficit in aphasia [31 p.112].

Both these approaches to aphasia have a direct bearing on testing and therapy. The Jones and Wepman [60] model led to the formulation of the Language Modality Test of Aphasia. Schuell and Jenkins' [31] test battery formed the basis of the Minnesota Test for Differential Diagnosis of Aphasia. Both the tests are discussed in Chapter V under Selection of Assessment Instruments.

Jones and Wepman are critical of the conclusions reached by Schuell and Jenkins [21]. They base their criticism on the fact that the tests were "highly restricted" and that "... an inappropriate method of analysis was used to prove the existence of a single hierarchy of language functions." On the other hand, factor analysis on which Jones and Wepman base their theory is also open to bias in the sampling of tests.

A possible compromise is sought by Osgood and Miron [31 p.126] who add the following conclusion to the above dispute.

Even if factors such as visual versus auditory input modality and vocal versus manual output modalities are not dimensions of aphasia, the general factor reported by Schuell and Jenkins may be analysed into at least two separate bipolar factors, which are dimensions in aphasia. One factor represents differences in levels of involvement, i.e. symbolic versus skill or abstract versus concrete. The second represents differences in process, i.e. receptive versus expressive or decoding versus encoding.

After having read through the literature, it is felt that the important consideration today must be a pragmatic one. What can the aphasic do at present and how can he be helped to regain more of his lost abilities?

The arguments put forward by various writers to support their models or terminology of aphasia lose their importance when it is realised that very often authors are describing the same disorders under different names. This appears to lead to confusion amongst professional workers handling one case at the same time, and it is often preferable not to label a patient "predominantly sensory aphasic" or "pragmatic" aphasic but to describe his difficulties in more easily understood terms until a more widely accepted terminology is in common use amongst doctors and therapists all over the world.

Spreeen [45] believes that a psycholinguistic approach to aphasia has considerable promise. The clinician often feels that the traditional testing methods limit his approach to the statement of loss and expression of "how much." He cannot express the patient's "impoverished" speech, which he knows is simplified, or distorted in its grammar, or faulty in choice of words. The psycholinguistic approach provides the opportunity to analyse these features.

But the psycholinguistic approach is only in its infancy and much study and research remains to be done before we can really call our approach to the study of aphasia, psycholinguistic.

Until such time as a true psycholinguistic descriptive analysis of aphasic disturbances is available, this writer is not in favour of using any classification. It is felt that a full analysis of the patient's assets and liabilities at the time of observation and testing is less confining and more informative and valuable to the clinician. Classifying or labelling the aphasic tends to "pigeon-hole" the clinician's attitude towards the patient's difficulties and often stunts therapy planning. The Jones and Wepman [60]

classification based on the L.M.T.A. may be the closest to a "true" psycholinguistic approach which is used today, but this writer finds the labelling of patients as semantic, pragmatic, etc., confusing and is hopeful that in the near future a more internationally understood and accepted analysis of aphasia will provide a basis for psycholinguistic therapy.

For the purpose of the present study, a description will be given of each patient in Chapter VIII, showing where his main difficulties lie. Patients will not be classified into any of the known classification systems which have been queried by various authors mentioned previously. Rather, each patient will be described as an individual who has suffered a brain trauma or disease, and presenting a number of symptoms which have to be treated clinically.

Summary

A brief historical background to the study of aphasia was presented leading up to modern theories of functioning of the cortex which are relevant to aphasia. Emphasis was laid on the recent developments in psycholinguistic theory, which have a direct bearing on testing and language therapy in the aphasic patient. In conclusion, it was decided not to adhere to any classification of aphasia for the purpose of this study, but to describe each patient in terms of his abilities and difficulties.

CHAPTER III

A BACKGROUND TO BILINGUALISM AND APHASIA

"The study of aphasia in bilingualism or polyglots promises unique insights into both the nature of aphasia and the workings of psycholinguistic processes" [31 p.135].

Minkowski [30] is of the opinion that aphasia in polyglots provides with the opportunity of observing and studying the,

... comportment and pathological dissolution of different particular languages of an individual as natural functional systems represented in his brain and of comparing them with each other in their disturbances at a given moment and in the course of time.

As a prelude to understanding what happens in the bilingual and polyglot when his language processes are disrupted due to aphasia, it is essential to review briefly how these individuals have acquired two or more languages, and what effect this acquisition may have had on them as normal individuals.

The final question to be answered in such a discussion is whether or not bilingualism exists. At a CIBA conference on aphasia in 1963, experts in the study of linguistics argued over the existence of a true bilingual. The conference report is not very helpful on this point. Although several delegates quoted their own personal experiences, e.g. Dr. Langer quoted the sensation of dreaming in one language, yet no-one really defined the term bilingualism clearly. Mrs. Milner of Quebec doubted the existence of true bilingualism, although she admits that in Quebec they have the opportunity of observing

something which may be bilingualism. She stated that people, who have grown up in households where both French and English have been spoken from the start, have a composite knowledge of both languages and are able to switch completely from one to the other, although in testing they may know a word in one language but no corresponding word in the other. This gives rise to doubt in her mind about true bilingualism [31 p.119].

Jakobson quoted the works of Leopold, an American linguist, who wrote of his experiences in speaking only German with his little daughter, while his wife only spoke English to her. The child had an absolute mastery of both languages but obviously each carried a slightly different emotional connotation. Nevertheless, Jakobson regards this as a true bilingual. A definition of bilingualism was given by A.S.C. Ross [11 p.119]. He was in no doubt that bilingualism exists and spoke of the bilingual as a person speaking both languages perfectly. Such a definition does not take into account the conditions under which the languages were learnt and it is felt that the definition proposed by Osgood and Ervin gives us a more lucid picture of the problem [31 p.135]. The latter have formulated a psychological theory of bilingualism which incorporates the linguist's notion of two forms of bilingualism accounting for the differences in types, in terms of the manner in which bilinguals acquire and use their two languages. The compound bilingual is one who has learnt two codes, i.e. two systems of signs more or less as a set of translation equivalents for example in a bilingual home. Here two sets of linguistic stimuli and responses for the same mediating processes are present. The coordinate bilingual has, however, learnt his two codes under different circumstances, e.g. one as a child and the other as an adult. Here different mediating processes operate between the two sets of linguistic stimuli and responses [39 p.135]. Osgood and Miron quote Lambert as providing behavioural evidence in support of this theory for non-aphasic individuals. In Lambert's

research project in Canada,

... the profile differences for the 'same' concepts presented in the two languages were determined for French-English bilinguals varying in degree of compoundness as estimated from life-history criteria and from latencies of associated responses to stimulus words. [31 p.136]

The results obtained proved the theory of Osgood and Ervin. Lambert found that the profile differences were significantly greater for coordinate bilinguals when the two languages had been learnt in different linguistic communities, i.e. when presumably different significances for signs were operating. The same subjects were then tested for retroactive interference, i.e. they were given a test of English words to learn and then the interference of an interpolated list of French words upon the retention of the English words was measured as compared to the interference of an interpolated list of English translation equivalents. The prediction that the coordinate bilinguals would show less interference since in theory their mediating processes are less similar for the two languages, was proved correct [31 p.136].

Dr. Uriel Weinreich [21 p.53], a linguist of Columbia University, talks of languages being "in contact". He explains this concept by saying that languages are said to be "in contact" if they are used alternately by the same person. The practice of alternately using two languages will be called bilingualism.

Psychological conceptions of bilingualism and interference vary from one school of thought to another. From the point of view of the individual, the two languages are two types of activity in which the same organs are employed [53 p.71]. Weinreich quotes an early theory of Epstein's, in which the latter found that a direct association between an idea and a foreign word is possible. But he believed that the knowledge of one language intervenes

in the learning of subsequent ones. If one has formed associations between (a) and (b) the formulation of an association between (a) and (c) is inhibited and once the association (a)-(c) is formed, the reproduction of either (b) or (c) in association with (a) is inhibited. Therefore, bilingualism is an obstacle in ideation [53 p.71]. This theory was criticised as applying only to adults and being outmoded in the field of "psychology of thought". Stern [53 p.72] believed that contrary to Epstein's theory a knowledge of several languages leads to individual thoughts and an understanding of shades of meaning.

In Weinreich's study of Language in Contact [53 p.14], the terms mother tongue or native language are not used. Instead he prefers the use of primary and secondary languages. It is of interest to know to what extent a second or third language will affect the first language learnt by an individual.

No easy way of measuring or characterising the total impact of one language on another in the speech of bilinguals has been, or probably can be, devised [53 p.63]. The only possible procedure is to describe the various forms of interference and tabulate their frequency. The deviations from the norms of either language which occur in the speech of bilinguals as a result of using more than one language is referred to by Uriel Weinreich as "interference phenomena". When a bilingual uses a phoneme of the secondary language, and in so doing subjects it to the phonetic rules of the primary language, interference has occurred.

In order to study the interference of one language on another, the differences and similarities of each language must be investigated from every point of view - phonic, grammatical and lexical. The forms of mutual interference of languages can be stated in terms of descriptive linguistics. There are,

of course, also many extra-linguistic factors which will affect the speech of the bilingual, e.g. socio-economic factors, attitudes towards the culture of each language community, etc. Language contact can thus best be studied in a broad psychological and socio-cultural setting on an interdisciplinary basis [53].

One manifestation of linguistic interference is an utterance containing elements which belong to another language but which are understood by both speaker and listener. There are many examples of this in everyday conversation in Israel, where words such as 'shalom' (goodbye) or 'bevakasha' (please) are freely dispersed among the primary language conversations of non-Hebrew speaking individuals. Often phonemes or semantemes cause language interference. Weinreich quotes words such as 'cold' and 'kalt' sounding the same to a Yiddish-speaking American. Identification of semantemes may cause a Russian to use the sentence 'I have long feet' meaning legs, or to identify word patterns such as 'I him see' which is admissible in Russian [53 p.8].

A structuralist theory of communication distinguishes between speech and language and assumes that "every speech event belongs to a definite language" [53 p.7]. Transferred or "borrowed" elements in language are those parts of an utterance which the speaker or listener recognises as coming from another language. This Weinreich calls an example of linguistic interference.

In a detailed description of the types of interference that may occur in a bilingual's speech, Weinreich enumerates and elaborates on phonic, grammatical and lexical interference. "Phonic interference concerns the manner in which a speaker perceives and reproduces the sounds of one language which might be designated as secondary, in terms of another to be called primary."

In a very interesting detailed analysis, a case of a Swiss man speaking Romansh and Schwyzertütch as his secondary language is described. For example, there is confusion between the /k/ sound and the /k^h/ which leads one to distinguish a Romansh accent in Schwyzertütch [23 p.124].

Not all phone substitutions lead to misunderstandings. The foreigner's use of a guttural /r/ in English will not change the meaning of his word, e.g. in Israel the Israeli use of a guttural /r/ in English words such as 'room' or 'car' marks his speech as foreign but nevertheless understandable. There are several ways in which one vocabulary can interfere with another. Morphemes may be transferred from one language to another or may be used in "new designative functions". Simple words may be transferred into the secondary language, i.e. German holismok (holy smoke) [53 p.47].

Lexical borrowing is less restricted in bilinguals than phonic or grammatical interference. Why should borrowing of vocabulary take place even among unilinguals? Weinreich [53 p.56] believes that the need to designate new things, places and concepts is one of the reasons. Polish and Ukrainian have borrowed Rumanian words mostly in the sphere of mountain habitat and cattle grazing. Certain internal factors in a language also contribute to innovating processes, e.g. low frequency of words. Frequent words come easily to mind and are more stable, infrequent words are more subject to oblivion and replacement. Sometimes homonymy causes borrowing. Because of the similarity and clash between words such as carrum (cart) and carnem (meat) the Bosges borrowed volture and viande from French. Often affective words lose their expressive force and others are borrowed which are felt to be more expressive. Synonyms are adopted when available. This comes more easily for the bilingual. The question of social values is also of importance in borrowing of words. The bilingual is likely to borrow and use words from a

language which he feels adds to his prestige and social status. Many Israelis use English words freely in Hebrew sentences for the above reason [53 pp. 56-60].

The bilingual may choose to transfer phonemic sequence from one language to another, e.g. American Italian azzoraiti 'thats all right' or to extend the usage of a word to conform with a foreign model. Compound words and phrases are also often transferred either completely or in part [53 p.47-50].

There is a lack of agreement by many prominent scholars of language as to the possibility of grammatical interference, but Weinreich believes that such influence may be studied if both languages are described in the same terms, in a given contact situation [53 p.29].

The sentence 'he comes tomorrow home' is an example of a grammatical relation of word order from one language (German) to morphemes of another (English) and such interference is common in the speech of bilinguals [53 p.37]. Examples of interference of word order are common, as are interferences in modulation patterns. The Israeli child whose home language is Hebrew can be heard asking in English 'you want tea' with the voice rising on the last word.

A language community may under the influence of the speech of bilinguals, extend the functions of the morphemes in its language. This may include the creation of new grammatical categories which are 'freer' or more explicit than the original grammatical form. For example, the possessive suffixes in Israeli Hebrew are falling into disuse (bet-cha 'house-your' is much less common than ha-bajit shel-cha 'the house of you') under the influence of the European mother tongues of so many Israelis. The opposite type of influence

which changes a system to a less explicit form is quite rare but is known to occur [53 p.52].

Often a choice is made by a speaker whether or not to integrate transferred words. The choice seems to depend on individual psychological and socio-cultural factors and is more clear-cut in the integration of grammar than sounds [53 p.46].

Uriel Weinreich [53 p.121] puts forward evidence of the detrimental effect of bilingualism on children and states that because of the lack of agreement in different parts of the world about the teaching of a second language, this task is put off until the tenth or eleventh year.

The writer cannot agree with this, as almost every child in Israel is bilingual, with no obvious ill effects. It is true, of course, that the child speaking Hebrew as his primary language will have a richer vocabulary initially, but the bilingual child appears to catch up very quickly. Penfield and Roberts quote neurological research which establishes the years from 4 to 10 as being the maximal time for acquiring a second language [32 p.256].

BILINGUALISM AND POLYGLOTTISM IN APHASIA

From the time that Broca aroused interest in the subject of aphasia, neurologists began to examine and report on the effects of aphasic disturbances on bilinguals or polyglots. Many case reports appeared in the literature and from these, various "laws" have been deduced. Charlton [10] in writing of Ribot (1906) says that the latter claimed that the language learnt

earliest in life by the patient was the last to be lost and the easiest to recover. This hypothesis seemed "attractive both on neurological grounds in view of the vulnerability of recent rather than remote memory to cerebral insults, and psychologically, since it seemed to emphasize the importance of childhood training."

Pitres, a pupil of Charcot, who published a study entitled "Etude sur L'Aphasie Chez Les Polyglottes" in 1895, thought that the patient would be more likely to retain the language he used most frequently prior to illness although it may not have been his original language [10].

Professor M. Minkowski [31 p.36], of the University of Zurich, thinks that "the language most strongly supported by emotional or affective factors" such as prestige, or language of spouse or a language of childhood will be preferred. Minkowski [30] believes that a similar deviation from the rule of Pitres may take place if the most current language of the polyglot aphasic presents particular difficulties in reactivation and restoration. This may be due to its mode of acquisition and "... its special linguistic structure in view of the specific localisation, extension, neuropathology and dynamics of a brain lesion in the dominant hemisphere or in both." This may be the case of a dialect suffering a temporary or lasting inhibition relative to the literary language.

In a paper presented to the 11th Congress of the International Association of Logopedics and Phoniatrics in London in 1959, Joan van Thal [52] described her experiences with patients whose native language was not English. Out of 13 patients only two recovered their mother tongue first, seven used English first as a necessity, three by force of habit and one for affective reasons. Miss van Thal supported the view of Minkowski that many cases of aphasia do not recover their most familiar language first for psychological reasons.

In reading through the literature and case histories available, it would seem that bilingual and polyglot aphasics differ greatly in their manner of reacquisition of language and in the first language relearned after illness. Several explanations are offered to explain this phenomenon.

Minkowski [30] believes that the particular language an aphasic will begin to use after illness is dependant on psycho-biological conditions, wants and necessity of an individual. This approach appears to be supported by Roman Jakobson, who expressed the point of view at the CIBA conference that the language with which the patient has the strongest emotional ties would prevail. He seems to think that women are more affected by this rule of emotionality [11 p.120]. Another delegate to the CIBA conference, E. Bay [11 p.120], is of the view that necessity rules the reacquisition of language. If one becomes aphasic in England, then English will probably return first. However, Jakobson disagrees with this observation. He quoted Jews in New York hospitals who have spoken English for years but after a motor accident could only speak Yiddish, their childhood language, which they had nearly forgotten prior to trauma [11 p.120].

According to Geschwind [27], the most extensive work to date has been done by Lambert in Montreal who has found that it is not always the patient's native language which returns first. He believes that the language which is best preserved when the patient becomes aphasic, is the language which he was using most and knew best just prior to becoming aphasic. He quotes Howes as having decided that it is not reasonable to compare the two languages in polyglot aphasics until the patient is given a few days' practice in the less used language. Under these circumstances he found, by use of his statistical measures of aphasic language, that the patient was equally proficient or equally poor in both languages. Thus, he concludes that the differences

described in the performances of patients in different languages may be due to giving the patient inadequate practice in one of his languages.

Lambert and Fillenbaum are quoted as having completed a paper analysing some 26 European cases and 14 Montreal cases in relation to the hypotheses of Ribot, Pitres and Minkowski [10]. The cases in Montreal displayed support for both Ribot's "primary" principle and Pitres' "habit strength" principle, simultaneously, but the European cases quoted by Lambert support either one principle or another, many supporting Minkowski's "rule" of the emotional factors concerning a particular language being most important in its recovery [31 p.36]. Charlton [10], although admitting that this study is more systematic than those undertaken up till now, points out that Lambert and Fillenbaum's study was not carried out on an unselected group of French-Canadian aphasics. The authors relied on case reports from European literature to gain information on patients who learned second languages later in life and not simultaneously with another tongue. They considered this a 'pilot study' and their findings not conclusive.

In Minkowski's [30] article on polyglot aphasia, he reviews several workers in the field and quotes Pitres as coming to the conclusion that a polyglot adult aphasic does not necessarily suffer a loss of language to the same degree in all the languages he knew prior to illness. Usually the patient begins to understand then to speak the language which he used most at the time of onset of the aphasia. This is not always his mother language but mostly so. Other languages are slowly regained. Pitres, as quoted by Minkowski, believes that this "... systematic restitution of linguistic functions is due to the centres of speech having been 'shaken' but not destroyed." They resume their lost function after a certain lapse of time. Pitres believes that this temporary loss of function is sufficient explanation for the

"phenomena in polyglot aphasics" and there is no necessity to try to find separate centers in the cortex for each language. In fact, he emphasizes that the systematic regression of aphasic symptoms in polyglots negates the existence of separate centers for each language. Pitres observations made in 1895 are still significant today. As Minkowski states

... it seems in fact difficult to realise how and why the usually irregular vascular or traumatic lesions in the cortex or subcortical white matter should affect in a more or less selective way mostly the centers and pathways connected with foreign languages and spare those serving the mother language or the most current one, or in some cases bring forth an inverse selective result. [30]

Minkowski [30] believes that a more acceptable explanation of the aphasic condition in regard to different languages lies in the "function and dynamic relation between them in a common cortical substratum." In certain pathological conditions it is observed that one language may be more favoured and yet also be an inhibitor.

Henshelwood (1902) as quoted by Minkowski [30] describes a case of an Englishman, aged 34, who spoke English, French, Greek and Latin. He became completely aphasic after an apoplectic stroke. His aphasia improved gradually but he was left with a marked alexia. When his reading was tested it was found that he read Greek correctly, Latin not so correctly but more fluently than French and the latter still better than English. The conclusion reached here is that Greek and Latin were learnt more by vision, i.e. reading and writing than by hearing, French occupied an intermediate place and English being the mother tongue was learnt originally by hearing and repeating.

Hecaen [11 p.120] finds that the disorganisation is similar in every language that one is able to speak fluently. He appears to be supported in this idea by Milner of Quebec [11 p.118] who says she has never seen a

striking difference between the degree of aphasia in one language or the other in Canada. She believes that when a difference is seen it is a reflection of the skill of the observer. She further comments that in Quebec where people speak both French and English well, they do not succeed in keeping the languages separate.

An interesting study done in New York city amongst aphasic Puerto Ricans who had learnt English as a second language late in life is reported by Eisenson [11 p.121]. The subjects were permitted to identify a series of pictures in any language that came to them. Not one of them identified consistently either in English or Spanish. All of them identified some pictures in English and these tended to be pictures related to American culture. It probably had some status significance too. Another factor which was brought out by Charlton [10] indicated that many polyglots have strong feelings about languages and on emotional grounds may refuse to speak one language, e.g. it was found that the German refugees in New York may refuse to speak German even when their English is very poor and their refusal may persist even when the patient becomes aphasic. In his recent study of 10 bilingual aphasic cases in New York, Charlton came to the conclusion that all languages are affected to a similar degree. In only two of the cases was there any evidence of one language being preferred in use or retention. In both these cases psychological factors were attributed as causes for the patient preferring one language instead of using both [10].

Minkowski [30] stresses,

... the extreme individual variability of clinical, psychopathological, neurophathological, linguistic and social features of each individual case of aphasia in a polyglot, making it a special and difficult problem to solve.

The language which a polyglot aphasic recovers first and uses more than other languages is dependant upon his whole personality, his wants and needs. The writer feels that this summing up of the problem by Minkowski, gives a true picture of its complexity. The factors that will influence a normal adult's acquisition of a second or more languages and his ability to use them freely in conversation, writing and reading, will probably play a part in his re-acquisition of these languages after aphasia.

After quoting several cases of his own and from other writers all over the world, Minkowski feels that there is sufficient evidence to support deviations from the rule of Pitres, especially if at the moment of the onset of aphasia pressing, deep-rooted emotional needs, cause the patient to use a language other than is his usual or most currently used one [30]. Charlton [10] expresses the view that psychological factors such as the desire to retrain the more socially accepted language or not to be considered a 'foreigner' may be found to be decisive in the choice of language regained.

The relationship between the languages previously spoken by a polyglot may be 'synergistic' or 'antagonistic' or 'mixed character'. By whichever method the language was originally learnt "... there exists a natural synergy between the primary and all secondary languages," according to Minkowski [30]. This is evident in the aphasic where all languages are affected and then gradually restored though at different rates and to a different degree. Minkowski [30] believes that there is often an intermingling of two languages on speaking and writing which seems to support the idea of a common representation or close representation of "different languages in a common substratum of the brain."

It is important to understand general laws of physiology in order to understand some of the complicated phenomena which are manifested by the polyglot aphasic. According to the laws of excitation, synergy and antagonistic relations are closely connected in "... organised cerebral functions like languages ...". To demonstrate this point, cases were presented by Linkowski [30] which showed how aphasics sometimes re-acquired one language (not always the mother tongue) and then gradually lost this language again when re-acquiring a second language. In one case this second language was the patient's mother tongue and in another case a Swiss-German professor is quoted as having relearned French and literary German but never again mastering his mother tongue.

These examples further prove how complex the problem is and how, with so many complex neurological, genetic, linguistic and other factors at work simultaneously it is practically impossible to explain aphasia in polyglots from one particular theory only.

Halpern [17] quotes three of his own cases. The first, a man who had spoken German as his home language and later acquired Hebrew on immigration to Palestine. After being wounded by a bullet at the age of 24 he gradually regained Hebrew speaking, reading and writing but his German was full of faults. Halpern feels that this is a deviation from the rule of Pitres. A second case is described by Halpern of a Russian immigrant whose Hebrew returned completely but whose Russian remained very poor. Halpern's third example is of an American immigrant whose first language to return was his mother-tongue and who suffered great frustration when he returned home and found that he could not understand or converse in Hebrew with his children. With a conscious effort he managed to regain Hebrew. It appears to this writer that all three of Halpern's cases show that the language most necessary

to the patient will be the first to be relearned or will be re-established with effort as in the third case. The affective emotional factors appear to be of vital importance in the re-acquisition of a particular language after aphasia. The cases of Halpern have been chosen out of many cases quoted by Minkowski and others because they represent the only other attempt at recording the recovery of the speech of polyglot aphasics in Israel prior to the present study.

Summary

In summary, it may be said that the study of aphasia in bilinguals and polyglots provides the linguist with an excellent opportunity to study learning and relearning of languages. Many writers have questioned if bilingualism exists and if so, how to best define it. The distinctions made by Osgood and Miron [31 p.135] between compound and coordinate bilinguals appear to best solve the problem. The study of bilinguals also affords the opportunity to study the affect of languages on one another and the different forms of language interference.

In recent times there has been no general agreement as to which language returns first after an aphasic condition. This writer agrees with the statement made by Minkowski [30], that the whole personality of the patient, with all its implications, is the guiding influence on the reacquisition of any particular language in the aphasic patient.

CHAPTER IV

APHASIC THERAPY

The notion of rehabilitating patients who have acquired aphasia was relatively unknown on a large scale basis until World War II. Up until then interest in aphasia was focused mainly upon its neurological classification.

A philosophy of aphasia therapy is based upon what the clinician believes to be the nature of the aphasic disturbance. It is dependant on one's belief in either stimulating all modalities or only concentrating on one modality. It is influenced by the clinician's approach to the aphasic as a person and is affected by the clinician's ideas of testing and the amount of information available from test results.

In this chapter the writer intends to outline some modern approaches to therapy and to briefly describe a few research projects which have had an influence on therapy. Certain accompanying problems which affect the aphasic patient will be outlined and special problems affecting polyglot and bilingual patients will be dealt with.

Prior to treating or even testing a patient, a full case history is required. In the present project, a summary of the neurological and general medical findings was available for the therapist. In the general case history, factors of special significance included date of arrival in Israel, languages spoken prior to illness and circumstances under which Hebrew was learnt.

In order to take a full case history, the family of the patient should be interviewed as early as possible. Their anxiety must be allayed and their desire to help the patient turned into constructive channels. An understanding, cooperative family has proved to be of great assistance in the aphasic's rehabilitation.

Schuell et al [37 p.332] believe that methods of treatment are subject to prejudices determined by the therapists ideas concerning the "nature of the disability being treated."

The writer believes that there is no one approach or one method which is applicable to aphasics and aphasic therapy in general. But whatever methods are used, certain general principles can be kept in mind. As a result of testing the patient, the therapist must know what his abilities are and where it is appropriate to commence therapy. The general principles of behaviour therapy, i.e. carefully selecting stimulus materials and reinforcing correct responses, should provide a basis for treatment. This may be taken to extremes as in the use of teaching machines or may be used as the basis on which to build a freer and wider programme such as was used with the majority of patients in the present study.

Clinical techniques are effective for some patients and not for others. It is the responsibility of the clinician to be aware of this problem and to discard a technique when it is not of value [37 p.333].

The aphasic patient wants to improve his ability to communicate, and recover sufficiently to be able to continue with his life. The clinician must be aware of what goals the patient is setting for himself. When they are realistic he should be helped to reach them.

What is important to the therapist in treating a patient is to analyse, through test results, what exactly the patient is able to do and where he has difficulties. The location of the patient's lesion is not of such great importance as the understanding of the patient's remaining abilities and disabilities. Therapy should be based on this analysis. The tendency to "label" a patient is too confining for a dynamic approach to therapy and it is preferable to think of the patient as an adult, unable to understand and communicate in various spheres, and able to do certain tasks. Most modern aphasic tests give the therapist the above leads. Recent tests such as the Wepman Language Modality Test of Aphasia [60] and Schuell's Minnesota Test for Differential Diagnosis of Aphasia [38] give the therapist detailed information as to where the patient's language process breaks down. As Jakobson [20] said, the emphasis is on description and not labelling of patients. "Call it what you want. All that matters is to know what you are speaking about". This appears to be an apt comment on the attempt to label aphasic.

Martha Taylor [47] divides the various approaches to therapy described in the literature into three large general categories: (1) The Non Specific Stimulation Approach, (2) The Specific Stimulation Approach, and (3) The Psycholinguistic Approach. This writer has numbered Taylor's subdivisions of each of these approaches to make the following discussion of her analysis clearer:

1. The Non Specific Stimulation Approach

(1a) Spontaneous Recovery - The first approach follows the belief that aphasia is an irrevocable state and the only progress which will take place will be as the result of spontaneous recovery. Many physicians support this view.

- (1b) The Environment Stimulation Approach suggests that recovery from aphasia takes place under combined effects of spontaneous recovery and verbal stimulation. This means that the environment of the patient should be filled with as much verbalisation as possible. Followers of this approach believe that auditory stimulation is of great importance, but in general it is not important what stimulation is given as long as it is of a verbal kind.
- (1c) Rapport Approach In this approach the context or method selected is not considered important as long as a warm relationship exists between clinician and patient.
- (1d) The Socialisation Approach follows the principle that motivation via socialisation will lead to an improvement in the aphasic's condition. Group sessions are usually held.
- (1e) The Psychotherapeutic Approach concentrates on the problems of anxiety and loss of self esteem with little or no direct attempt to retrain language.
- (1f) The Interest Approach attempts to stimulate interest in the treatment process by selecting subject matter which was of interest to the patient prior to illness.

3. The Specific Stimulation Approach includes the following:

- (2a) Association Approach which attempts to introduce an infinite number of possible associations for a word, and hence strengthen the patient's association for the word and ability to recall it.

(2b) In the Situational Approach every-day situations are acted out, and the

(2c) Auditory Stimulation Approach is used by those who believe that patients improve in their ability to understand, read and write when auditory stimulation is employed. The length of each unit and word frequency comprise the basis for choice of therapy materials.

(2d) The Minimal Difference Approach is based on the idea that one of the aphasic's primary difficulties is the kinaesthetic and/or visual recognition of similar small language units: the written letters and phonemes. Therefore minimal word pairs, similar sounding words and minimal spelling differences in words are often used as stimuli in teaching.

Taylor [47 p.8] believes that in reviewing all the above methods, aphasia therapy has been dominated by random trial and error based on intuition and improvisation.

The present writer cannot accept this rigid approach as being a valid criticism of therapy to date. As will be shown further on in this chapter, Schuell [37] and her co-workers have developed therapy techniques based on an understanding of the patient's disability and incorporating a number of the approaches described above by Taylor. It must be noted, however, that even experts such as Schuell appear to reach a point in the treatment of a certain type of severe aphasia, where imitation is possible but no carryover into spontaneous speech is effected [27]. The solution may lie in the type of psycholinguistic programme as outlined below by Taylor.

3. The Psycholinguistic Approach

The psycholinguistic approach is used by a very limited number of clinicians. It is important for clinicians to understand the process of language learning in general. The learning of a language is based on pattern practice of the fundamental structures of the language. To facilitate the establishment of language habits, the linguists suggest that in pattern practice the utterances must be short, vocabulary must be selected on the basis of frequency of occurrence and only one item at a time should be taught. Patterns should be built on vocabulary already learnt and different linguistic features should not be mixed.

An interesting observation made by Goodglass [47 p.13] is that the plural form of words are more likely to be retained by aphasics than the possessives, even if the two words may be identical phonemically, e.g. 'bills' and 'Bill's book'. This is of great importance for the aphasia therapist.

A study which has some bearing on the psycholinguistic treatment of aphasics was reported in 1962 by Rochford and Williams [34]. They studied the relationship between the breakdown of naming ability in aphasics and the acquisition of vocabulary in children. The conclusions drawn were that there was a highly consistent order of difficulty in both groups of subjects. The authors thus believe that the breakdown of speech seen in pathological conditions shows some parallels with its acquisition in the developing individual.

It may be possible to suggest a further conclusion that the adult aphasic should thus be retrained in language acquisition in a programme which is designed in accordance with the vocabulary acquisition of the child.

The primary task of the clinician in a psycholinguistic approach is to decide on what responses he wants to teach, "... arrange matters so that these

responses occur as frequently as possible, with emphasis on success rather than errors" in order to "reinforce the successful responses" [47 p.14]. Such an approach to therapy is based on two principles. The first implies that aphasics should be retrained by taking into account psycholinguistic findings on language learning. The second is a belief in the use of operant conditioning and programmed learning. Most of the responses we are interested in teaching aphasics are operants: "If we desire to change behaviour one way to do it is to wait for the desired response to occur and then reinforce it" [47 p.14].

Very little has been reported in the literature on programmed learning in general and in particular with aphasics. One of the few reports found by this writer concerns an experiment by Taylor [47] on programmed learning with a group of severely impaired aphasic patients who had not responded to conventional treatment. This experiment was carried out in New York. The patients were submitted to a carefully designed pre-verbal programme to train imitation, visual recognition and pre-writing activity. All materials chosen were done so by linguistically determined criteria. For example, the choice of objects for teaching of matching was based on linguistic elements connected with the name such as ease of phonemic elements, monosyllabic word, high frequency of occurrence in spoken language, etc. Taylor observes that while the material appears to be monotonous and repetitious, patients showed the maximum attention and very little anxiety. The programme enabled patients to work at their own rate and forces the therapist to work at the patient's real level of functioning. The results obtained on this study were very encouraging and it is hoped that programmes for less severely impaired aphasics will be worked out in the future, and will be available for therapists to experiment on in other parts of the world.

Taylor's approach is more rigid than the philosophy of treatment propounded by Schuell et al. It is this writer's opinion that the personal contact with the patient, which is of such great supportive value in the early stages of therapy, is minimized in a teaching machine programme. Such a programme also requires a great deal of discipline and experience, on the part of the therapist. This writer has had no practical experience with teaching machines and programmed learning in the Hebrew language, but believes that in certain patients this type of treatment may be the solution to the problems presented by the aphasic. It appears that a thorough knowledge of the whole therapeutic process in its minutest details, is imperative prior to the commencement of therapy. From one point of view this is an advantage as the therapist is forced to know exactly where he is going and what steps he is about to take. Conversely, it appears to this writer from only a theoretical knowledge of this type of therapy, that it may be too binding on the therapist and his ingenuity during the process of treatment. Not all therapists will be capable of carrying out such a programme.

Wepman and Jones [59] started their research in aphasia in an attempt to discover why certain patients did not improve, i.e. those in the global category. They began to explore in therapy the idea of whether one could move a patient progressively from a global aphasic state, through jargon aphasia through a pragmatic state to the semantic and finally syntactic state. This would take the place of the usual and often unsuccessful approach of trying to move the patient from his global disability directly to the semantic state.

At the Conference which took place at the University of California, Los Angeles in November, 1963, Wepman [59] gave a case illustration of this approach but it did not truly demonstrate his attempt to move the patient through the various states of aphasia. Geschwind [59] further criticised

this approach by stating that if we believe that localizations are different for different kinds of aphasia, it is hard to see how disturbances with different localizations could possibly be different stages in the recovery process.

Spreen [55] finds this approach to aphasic therapy, which is founded on the linguistic theory of regression, "an exciting" hypothesis, but so far not sufficiently substantiated. He believes that it should be possible to investigate such a theory because if it is true, recovery should follow a predictable course, as outlined by Wepman and Jones [59].

The approach followed by Schuell et al [37 p.338], is based on the supposition that "... sensory stimulation is the only method we have for making complex events happen in the brain." The clinician is not teaching the aphasic patient to speak, read or write. He tries rather to communicate with the patient and to "...stimulate disrupted processes to function maximally."

Schuell et al [37 p.339] enumerate six principles of therapy as presented below:

- 1) The first principle of treatment is the use of intensive auditory stimulation although not necessarily through auditory channels alone. In an experiment carried out as a prelude to the Minnesota Test of Differential Diagnosis of Aphasia [20 p 244], Schuell and Jenkins found that there is a relatively high frequency of association errors. When auditory stimuli alone were presented 59% of all errors were association errors. When visual stimuli were added, the test became easier for most patients. This gave the therapy lead of using visual stimuli with auditory stimulation and, in fact, many patients do respond correctly when they look at a word while it is spoken by the examiner.

- 2) The second principle of therapy is adequate stimulus, and the clinician must manipulate the stimulus so that the patient can perceive it.
- 3) The third principle involves the use of repetitive sensory stimuli. A patient may look confused when a word is said once, but after hearing it a few times, shows recognition and his attempts to repeat the word improve.
- 4) Each stimulus presented should elicit a response. When the patient listens and makes an appropriate response, a whole cycle of activity is set in motion, which "involves discrimination, selection, integration and facilitation of ensuing responses" [37 p.341].
- 5) It is an important aim of therapy that the clinician should elicit and not force responses.
- 6) Following on this comes the idea that the clinician should stimulate rather than correct. By this is meant that the clinician should not spend time in correcting wrong responses, but in getting the language process to work and the latter will happen when adequate stimulation is given. One modality should be used to facilitate another throughout the course of treatment. For example, spelling words aloud helps the patient to write them, hear them and then remember them. Meaningfulness of stimuli is of vital importance. In dealing with language, familiarity as opposed to novelty of stimulus is very important [27].

All clinicians treating aphasia, whatever their philosophy of treatment may be, recognize that there are psychological concomitants of the aphasic condition. These will influence the patient's ability to respond to treatment initially and to progress while under treatment. It is also important for the

clinician to be aware of these factors as they are part of the individual with whom he is working.

The psychological concomitants which are discussed below are: 1) Perseveration, 2) Emotional lability, and 3) Catastrophic reaction.

1) Perseveration is one of the side effects often experienced by aphasics. It is defined by Allison and Hurwitz [20] as "the continuation or recurrence of an experience or activity without the appropriate exciting stimulus." It is an involuntary process. The writers felt that there is a link between perseveration and either imperfectly comprehending a stimulus or imperfectly responding to it. Perseveration is one of the recognized symptoms of "clouding of consciousness" [20]. It persists after other symptoms of clouding of consciousness disappear and is often induced by asking a patient to perform a familiar act and then another, e.g. to print then write letters. Allison and Hurwitz believe that at the time of perseverating the patient has insight into his disability. Emotional tension and anxiety facilitate perseveration.

2) Emotional lability is a very common psychological condition experienced by aphasics [37 p.316]. It is an excessive reaction to a situation. The patient laughs or cries excessively although usually in an appropriate situation. He is uncomfortable and embarrassed by this behaviour, as are his family and friends, and it is necessary to explain the nature of the condition to them. The patient also feels better when he understands that his reaction is one experienced by many other aphasics.

3) A catastrophic reaction "... may be characterised as a 'psychobiological breakdown' involving the organism as a whole in a situation where a successful performance does not seem possible" [14]. Such a response is often the

patient's reaction to a situation which he finds too hard. He may show irritability, evasiveness or aggressiveness. It is often preceded by perseveration. Eisenson [14] believes that this type of reaction usually occurs in people who previously resorted to psychosomatic symptoms in order to avoid demanding situations. This type of reaction should be prevented or avoided by the therapist whenever possible. Both the perseveration and emotional reactions were dealt with frequently during the course of the present project and will be described in Part II of this dissertation.

The bilingual or polyglot patient presents difficulties in a therapeutic situation which are not found in other aphasic patients. The patient may often have feelings of inferiority in the second language and feel that he cannot progress. Some families object to the patient being taught in a language which was not his primary language prior to illness. The patient may also experience interference from one of the languages not being used in therapy. It is this writer's observation that most people, when counting, e.g. money, do so in their primary language. This is very noticeable in a country such as Israel where it is possible to tell a person's origins as soon as he begins to count or give change in a shopping transaction. Certain patients object to having treatment in a language that was less familiar to them than their own home tongue. This presents a problem of resistance and lack of motivation on the part of the aphasic.

One of the first tasks in handling a polyglot aphasic is to make it clear to him that in what ever language he is going to have treatment, it will be of positive value to him.

The problem of learning a new linguistic system was discussed at the Conference on Aphasia reported by Osgood and Viron [31 p.36]. It was generally

agreed that this is a difficult task. However, Eisenson [31 p.36] said that during the war, his group had trained some aphasics to read and write who, when their records arrived, proved to have been illiterate prior to injury.

In the present study, many patients will be treated who were very weak or almost illiterate in Hebrew prior to illness, and an attempt will be made to include reading and writing in the rehabilitation programme.

In general, the therapist requires a very patient and sympathetic attitude towards the aphasic patient. A very common mistake amongst hospital staff and laymen is to talk down to the aphasic and treat him as a child. This has to be guarded against.

Group therapy has a purpose of its own and is not as useful as this writer had previously supposed. It is limited in its application in aphasic treatment and to be of value, patients have to be carefully selected. Because the aphasic patient has to have treatment adjusted to his individual needs and his own pace of improvement, it is often wasteful to let him take part in a group where each individual is at a different stage of treatment. It is very rarely that two or more patients are found in one clinic at one time who are at a similar stage of recovery.

The purpose and advantage of group therapy for the aphasic is to see other patients at work and be encouraged by their progress. The accent in group therapy should be on common problems and not on individual difficulties.

Although Bloom [8] describes very good results in group therapy, because of the re-inforcement of correct verbal responses which takes place by the effect of verbal behaviour on the audience in a group, this writer has not

found this to be true. Possibly the choice of patients in the Institute of Physical Medicine and Rehabilitation in New York was much larger than those available for the present study, and thus patients could be better selected for group work.

Summary

The aphasic patient is an individual suffering from a communication disorder. He requires careful testing to analyze the exact extent of his disabilities and to pinpoint his most urgent needs. Once a starting point for therapy is decided upon, his treatment must include stimulation with carefully graded material, which allows the patient to progress at his own rate, which reinforces his positive responses and presents new challenges within his range of abilities.

CHAPTER V

TESTING PROCEDURES IN APHASIA

I. INTRODUCTION

The basic assumption that would underly a test procedure in aphasia is that the results obtained would yield information which will give an accurate description of the patient's present status, and also allow a prediction to be made concerning improvement to be expected and the kind of therapy to be used [48]. Schuell states that "an adequate diagnostic test must sample relevant kinds of behaviour in all language modalities over the entire range of aphasic deficit" [40 p.138].

The process of testing is essentially one of asking significant questions and making pertinent observations. A good test helps the examiner to make systematic observations under controlled conditions. Benton [7] views the construction of an aphasic test as involving careful selection of items, and considers the following aspects: pilot testing to determine reliability; validity and level of difficulty; collection of normative data for performance on each test of appropriate group of subjects; assessing the influence of age, sex and cultural status on performance level; determining the effects of practice or prior experience with the tests; and considering whether two or more equivalent forms of the battery should be constructed in order to permit unbiased repeated examination of the same patient. These factors should also be considered when a tester is evaluating available test batteries in order to select an appropriate assessment tool.

The approach to devising an aphasic test is dependent upon the examiner's philosophy of the nature and implications of aphasic disturbances. If the examiner thinks of the aphasic as having undergone permanent intellectual changes and having a new personality, then he aims at evaluating such change, e.g. Goldstein [14] believed that the various dysfunctions found in the aphasic patient are a manifestation of a single disorder which is the loss of ability to grasp the essential nature of a process. Goldstein and Scheerer [14] thus devised a test to measure abstract and concrete behaviour. Benton [7] stipulates the tester's concept of language as a precondition to the formulation of any aphasic test. There are other possible concepts of language which may be acceptable to a tester, and will determine the nature of the examination and the tests included in it. He may believe that there is only one basic language function which, in addition to various non-linguistic abilities, is disturbed in aphasia. Or he may think of language in terms of basic grammatical categories [7].

According to Schuell, Jenkins and Jimenez-Pabon [37 p.174], "Any testing methods that enable the examiner to observe adequate samples of language behaviour may be used." The aphasic patient has suffered a disturbance in his language behaviour. The examiner has to find out what abilities are retained, and where and why language is disrupted. The language behaviour of the aphasic patient is observed and as the underlying processes of language behaviour cannot be observed, they must be inferred [37 p.169]. Schuell et al. observe for example that "... a reduction of vocabulary and reduction of verbal retention span cross language modalities." They infer that "... the same processes operate in the retrieval of words and retention of sequences of words, regardless of the use to be made to them." If a patient could not say a word then he could not write it either or if a patient mispronounced

"house" as "four", he would write it this way too [37 p.170]. This writer has had the same experience with several patients to be described in the chapter on therapy. Thus, to summarize this point, the patient's language behaviour has to be carefully observed, underlying processes inferred from the observations and then evidence sought to support the inferences.

The problem of test construction in the field of aphasia is compared by Benton [7] to the problem of constructing intelligence tests. Because of the similarity between intelligence and language (both being controlled by central nervous system factors and both being cultural products "... with the social environment being an indispensable precondition for the development of each,") it is possible to look at the problems of I.Q. test construction and benefit from the experience gained therein. Benton believes that we are today in aphasic testing where intelligence tests were in 1900. Many aphasic tests are in use in different clinics throughout the world but according to Benton, "... there is little evidence in published form that they are well standardised, objective and useful" [7]. The preconception of the basic nature of intelligence determines the construction and use of tests, e.g. Raven's Progressive Matrices would theoretically be the best test if intelligence is thought of as a single general ability [7].

Benton [7] believes that with the diversity of conceptual approaches to aphasia, it may not be possible at present to achieve a single conceptual framework. As an alternative to this, he suggests a pragmatic approach to the standardisation of a basic aphasic examination. There are certain aspects of aphasia which all students of the subject will agree on as a necessity in testing, e.g. a test of visual object-naming and a test of oral language comprehension. Other items such as repetition of digits, words or sentences, says Benton, may be controversial. Some solution or understanding must be

found to the conceptual problems before a broadly acceptable standard examination for aphasia can be constructed.

Benton, together with colleagues in Italy, is in the process of constructing a battery of tests which it is hoped will form the basis of a multi-lingual instrument for the investigation of aphasia. This would go far towards establishing an operational understanding among workers in different parts of the world. The international test will not consist of identical tests but rather of essentially equivalent tests which have been standardised on the language population to which it is to be applied [7].

In recent times, the major projects of test construction have been carried out by Eisenson [12], Schuell [38] and Wepman [59]. In this chapter these tests, in addition to the Sklar Aphasic Scale (SAS) [44] will be reviewed. Reasons will be given for rejecting the Eisenson and Schuell tests in favour of the Sklar for this particular study. The Wepman and Lyle Language Modality Test of Aphasia (L.M.T.A.) was translated into Hebrew and adapted for use in Israel by Bar David [5] as part of the A.R.P. Because this study is an independent one, it was thought advisable by the writer to use an additional test and obtain independent results. All patients were tested on the L.M.T.A. as well as the SAS thus providing a control. Results will be presented showing the correlation of scores obtained on the same patients tested on both those tests.

II REVIEW OF TESTS FOR APHASIA

One of the first test-batteries devised for use especially for aphasics was completed by Head in 1925 [50 p.236]. He gave detailed instructions as to the use of the test such as the quietness of the room and recording everything the patient says and does. Head attempted to test a patient's ability to respond to auditory, kinaesthetic and visual stimuli. For example, one of the tests requires a patient to match objects seen, then to name the objects, then point to an object named by the examiner and finally to recognize an object placed unseen in his hand. The patient is required to respond to the same sequence of tests when presented in different ways. Many of the tests devised by Head were incorporated into later tests; e.g. clock-setting is used by Eisenson, paragraph reading and then relating in speech and writing what is remembered, is used by most examiners including Schuell, Eisenson and Sklar. Tests of arithmetical ability are also to be found in most of the more modern tests.

Weisenberg and McBride [54] based their findings on a research project carried out in 1929. They chose a wide variety of tests in an attempt to cover all the performances which may be disturbed and to provide for more detailed study of those performances which show the greatest or most interesting changes. Tests were provided to assess spontaneous speech, days of week etc., naming, repeating, understanding of spoken language, reading, writing and many other items taken from existing psychological and educational tests. As a result of this study, Weisenberg and McBride adopted the following classification: 1) Predominantly expressive, 2) Predominantly receptive, 3) Expressive-receptive, and 4) Amnesic. The importance of their classification was the recognition of the idea of "predominance". They emphasized the fact that expressive disorders were not pure and included elements of the

receptive and vice versa. The Weisenberg and McBride classification is used by Eisenson as a basis for the construction of his test.

Up until recent times the evaluation of the adult aphasic's language disturbance was almost entirely a measurement of his ability to read write, spell and speak in response to given stimuli. The test items varied in type and difficulty and the patient's responses were recorded on a pass/fail basis. For example, in the Eisenson test, one can obtain a picture of how severe the patient's disability is in auditory verbal comprehension, but this does not give a clue as to what underlying process has been affected or what causes the auditory verbal disabilities.

With the works of writers such as Jakobson [20] and Luria [26] (which were described in Chapter II of this dissertation) linguistic processes were emphasized and it is now as acceptable to think of aphasia as a psycholinguistic disorder as a neurological one [59 p.142].

Luria has not evolved one standardised test that this writer is aware of, but has provided a number of tests which investigate the linguistic difficulties presented by each type of aphasic. Luria [26 p.374] believes that the expressive and receptive aspects of speech should be considered separately in testing the aphasic patient despite the intimate connection between them. He also states that the level of speech construction must be investigated, e.g. if the patient can only name familiar objects or if he can pronounce a whole phrase, a different level of complexity is involved. A brief outline of the tests employed by Luria will now be discussed, followed by the tests devised by Wepman et al., Schuell, Eisenson and Sklar.

A. Luria [26]

The first step employed by Luria in testing, is to test phonemic hearing. He proposes several methods for this purpose one of which is to ask the patient to distinguish between pairs of similar or different sounds presented to him, e.g. 'b-p, d-t'.

The second stage employed is the investigation of word comprehension. Here again several alternatives are presented, one of which is to ask the patient to point to a picture whose title he is given from among a number of pictures placed on the table. The patient is next tested in his understanding of simple sentences and then logical grammatical structures. In this latter test, he may be asked to point to two objects, then to carry out some activity with the objects and lastly to carry out an activity which is requested in a more complicated manner.

In investigating expressive speech, Luria [26 p.330] requires the patient to repeat simple words, then more complicated words, words with only ^{two} ~~one~~ phonemes differentiating them, e.g. 'sample', 'temple'.

In discussing the testing of naming ability, Luria [26 p.398] describes the complexity of the process of naming by description, e.g. "What do you call the thing that tells the time?" Finally the patient is required to name the category such as "furniture" to which various items belong.

To test narrative speech, Luria [26 p.403] presents the patient with a simple picture which he is required to describe. On a simple level the patient is asked to describe events such as what he had for lunch, and this is gradually made more difficult until the patient is required to tell the story of a theatrical production. Another test requires the patient to add the missing word in a sentence.

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It is not possible in this chapter to give details of all the tests used by Luria. Only the tests of speech have been briefly described.

Luria [26 p.408] also tests the reading, writing and arithmetic ability of the patient as well as the intellectual ability. He attempts to analyze every possible aspect of the patient's difficulty. His tests reveal his extensive knowledge and understanding of the problems involved. They are not presented in a form which is practical for use by the average clinician treating an aphasic patient. But they provide a detailed study from which research workers in the field may draw for the purpose of devising their own tests.

Wepman and his colleagues [48] began to approach the study of aphasia from a linguistic point of view and as a result they revised their concepts of aphasia and aphasic testing.

Tikofsky refers to several studies conducted by Wepman and co-workers but does not give details [48]. As a result of these studies Wepman came to the conclusion that two essential roles of language may be described in terms of the Central Nervous System, i.e. transmissive functions and integrative functions [48].

Wepman and Lyle incorporated their findings into the construction of the Language Modality Test of Aphasia (L.M.T.A.) which was published in 1967 [60].

B. Language Modality Test of Aphasia (L.M.T.A.) - Wepman et al.

In the L.M.T.A., the patient is presented with a balanced set of tasks

which require the use of visual, auditory, oral and graphic abilities. This test of aphasia was constructed on the basis of experience with over two hundred aphasic patients and after recognition of the fact "... that existing methods of assessment of their language disorders failed to provide standardised information of either language loss or the language they retained" [60].

The test consists of two forms, I and II, each with comparable items of equalled difficulty. This writer considers this a distinct advantage in the L.M.T.A. over other tests for aphasia as the possibility of learning, as a factor influencing retesting results from the repetition of the same test items, is eliminated.

Another improvement on previous tests is the study of the patient's spontaneous story telling, which provides a measure of his ability to use syntax as well as vocabulary. In interpreting the results of the L.M.T.A., Wepman points out the most likely pathways for beginning therapy in accordance with the majority of correct responses in a particular sub-modality, e.g. when the majority of subject's errors are Category 2 (phonetic errors), his symbolic language processes may be considered relatively intact. "By combining the total responses scored in Category 1 (correct responses) and Category 2, an estimate can be made of the retained ability to conceptualise and symbolise in language" [60 p.21]. When the scores on visual stimuli responses and auditory stimuli responses are compared an indication of the better retained modality for language formulation at the symbolic level and therefore the most likely immediate pathway for success in therapy ... is obtained [60 p.21]. Similar clues for therapy are indicated by the scores obtained in other categories as outlined in the Appendix.

The Language Modality Test of Aphasia takes into consideration the fact that useful distinctions can be made between responses to visual and auditory stimuli.

Wepman and Jones [59] found a difference in patients' ability to respond to specific stimuli and their ability to communicate in instructed situations. This led to a psycholinguistically based scoring of responses, and to an evaluation of free speech of patients according to their vocabulary and ability to use it. Instead of using a pass/fail method of scoring, a scale of errors was devised which provides a psycholinguistic evaluation of each response. Differential scoring of items is related to the modalities of the input, and items are provided for evaluation of free speech. Each response is graded on a six point scale, as follows:

1.	2.	3.	4.	5.	6.
Correct Response	Phonetic or Orthographic Response	Syntactic Error	Semantic Error	Jargon or Illegible	No Response

The original version of the Language Modality Test of Aphasia is presented frame by frame on a film strip. Some items entail combinations of visual and auditory materials, e.g. selecting the picture that matches a spoken concept. Other items require the subject to name a pictured object and he is then presented with a picture and four printed words. He is asked to point to the word which names the pictured object. There are several such composite items in the test [3] p.198].

Wepman and Jones [48] depart from the traditional approach to the classification of the type of language impairment and describe the observed

deficit in linguistic terms. Five types of aphasia are described: pragmatic, semantic, syntactic, jargon and global [48]. One criticism of the L.M.T.A. which is made by Tikowsky [48] is that no attempt is made to evaluate reading comprehension beyond the sentence level. This writer feels that in the present study such a criticism is not of importance as so many of the bilingual and polyglot aphasics were unable to read more than the simplest material in Hebrew prior to illness.

C. The Minnesota Test for Differential Diagnosis of Aphasia (M.T.D.D.A) - Schuell [38]

The above test is divided into five sections comprising tests for auditory disturbances, visual and reading disturbances, speech and language disturbances, visuomotor and writing disturbances and disturbances of numerical relations and arithmetic processes. Each subsection has been graded from easier tests, which will explore residual abilities in severe aphasics, to more difficult items to test mild aphasic impairment. The test material is presented on cards which have been compiled into two small booklets and are easy for the examiner to handle. In addition, the examiner needs a number of objects. Schuell believes that short tests for aphasia are unsatisfactory as they fail to analyze the reasons for failure in each modality [39 p.23]. The Minnesota test was published in 1965 after many years of experimenting with the various test items at the Minneapolis Veterans Administration Hospital.

This writer believes the Minnesota test to be a thorough and good test and the reasons for not using it in the present project will be presented in a later section of this chapter.

D. Examining for Aphasia - Eisenson [13]

Eisenson's "Examining for Aphasia" was published in 1954. The test items were designed to reveal both assets and liabilities of the patient at the time of testing. The test items are divided into sections examining receptive and expressive functions. The patient's ability to identify sounds and then words is tested. He is also requested to answer simple questions and dictation is given. Arithmetic questions are included as are sentences and passages for reading comprehension. This test is less interesting in content and method of presentation than the M.T.D.D.A. and was also rejected for this project for reasons which will be given later.

E. Sklar Aphasia Scale (SAS) - Sklar [44]

The SAS [44] was developed at Wadsworth Veterans Hospital in Los Angeles, California. The purpose of the test was to measure the nature and severity of language disturbances resulting from brain damage, and to provide systematic information gathered on these disorders. Sklar based his scale "... on a modification of the hypothesis that language is a highly specialized form of behaviour acquired by an individual as a learned series of skills in manipulating language symbols and signs" [44 p.7]. Disturbances of verbal behaviour may be analyzed independently as part of many disorders or symptoms following brain damage. The SAS samples the linguistic skills of auditory-verbal and visual-verbal comprehension, oral speech and graphic behaviour and speech behaviour.

The SAS aims primarily at sampling functional language behaviour and test items were limited to those which fall into the category of "... over learned functional communication skills" [44 p.7]. The test materials were taken from

hundreds of items used previously in the investigation and evaluation of aphasics, and new materials were added in accordance with modern psycholinguistic theories which have been discussed previously in this dissertation.

In order to establish the SAS as a valid instrument for evaluating language behaviour of aphasic patients, five validity studies were done by Sklar with the test [44]. In a comparison of raw scores, means and S.D. on the Eisenson, Halstead-Wepman, Schuell Short Examination for Aphasia and Sklar Aphasia Scale, the Sklar test was found to have a mean score of 68.8 as compared to the Schuell 70.5, Eisenson 61.7 and Halstead-Wepman 63.5. The Standard deviations also indicated the comparability of the four tests. The coefficients between the four tests are high, the highest being .97 between the Sklar Aphasia Scale and the Schuell. The rank difference correlation method was used to evaluate the relationship between the Sklar Aphasia Scale and the Wechsler-Bellevue Intelligence Scale, Bender Visual Motor, Gestalt, Porchacn and Goldstein-Scheerer Tests. The findings suggest that language impairment as measured by the Sklar Aphasia Scale correlates significantly with the psychological constructs measured by the tests used. Sklar [43 p.89] describes an investigation of the relations between psychological and language test scores and autopsy findings in aphasia. The Aphasia Evaluation Summary (as the Sklar Aphasia Scale was then called) "... emerged as a reliable index of cortical deterioration on the basis of a comparison of its results and the neurologists rating of aphasia patients' autopsy protocols."

Concluding Remarks

The M.T.D.D.A is very thorough and easy to present. It is preferred by this writer to the Eisenson which is more time consuming and less interesting in content. The M.T.D.D.A. has also been thoroughly tested and used on hundreds of patients. The L.M.T.A. provides the most original and interesting form of presentation but must be well studied by the clinician prior to administration. It is more difficult to score than the other two tests. The SAS is an easy test to administer and score, although it may be more superficial than those described above. No test replaces extensive observation by the clinician. This writer believes that a test does not provide conclusive diagnostic data. It is only the starting point and guiding line for further observation. It is also hoped that one day a test will exist which can be used internationally and provide a diagnostic picture whose implications are understood by workers in many countries.

III. SELECTION OF ASSESSMENT INSTRUMENTS

In selecting assessment instruments in research, one has to have clearly defined exactly what one is attempting to measure and to what purpose the test results will be applied. In the present study, an attempt has been made firstly to evaluate the language disturbances of bilingual and polyglot adult aphasic patients before and after three months of therapy and, secondly to measure the carry-over effect of therapy into their home languages. All patients learnt Hebrew only in adulthood. Two distinct types of tests were required in the present study. The first was a good, easily adaptable and translatable, diagnostic aphasic test which could be used on all patients to

assess their aphasic disability in the Hebrew language. The second type of test sought was a simple assessment instrument to gauge the patient's ability to perform on several language tasks in his primary language. This latter test had to be simple so that a member of the patient's family could do the "testing" in a language usually unfamiliar to the clinician.

In the search for assessment instruments, the type of patient encountered and the fact that Hebrew, the test language, was of necessity and by definition, only a secondary language had to be kept in mind. Many patients were illiterate in Hebrew or very weak in reading and writing, and a test implying a former deep knowledge of the Hebrew language or providing long and difficult passages for reading comprehension, was deemed unsuitable.

A test was sought which would indicate areas of difficulty in language understanding and expression and which, although it would evaluate functional language and be easily translatable, yet would comply with the criteria set out by experts on aphasia testing.

Osgood and Miron [37 p.13] stipulate that a test battery, should attempt to measure language performances within a sensitive range of difficulty. If the examiner wants to compare a patient's results at different times or his results with those of other patients, a uniform method of administering and scoring the tests is required. This however should not defer the examiner from making "flexible, searching observations."

The translation and adaptation of an aphasic test such as the Language Modality Test of Aphasia (L.M.T.A.) [60] or Minnesota Test for Differential Diagnosis of Aphasia (M.T.D.D.A.) [42] is in itself a major task as demonstrated by the project reported on by Bar David [5]. The translation of a suitable test was only a secondary aim of the present study.

There are many examples of items in the M.T.D.D.A. where translation and adaptation to the Hebrew language would have required rewriting items and finding new pictures. The M.T.D.D.A. for example presents the patient with a set of cards showing pictures of objects with such similarly sounding names as 'peas' and 'bees' and the patient is required to discriminate auditorially between the pair. In the visual and reading disturbance tests, the patient is required to discriminate visually between such words as 'saw (was), town (down), store (stone), one (on)'. Another factor complicating translation, is that the Hebrew language has no vowels in the form of letters. Other items in the M.T.D.D.A., such as the difficulty of the passages provided for testing reading ability, were considered unsuitable for use in the present study, where the majority of patients did not have the ability to read difficult material prior to illness. The test is also long and very detailed which was not considered necessary for the present purposes as all patients were also tested on the L.M.T.A. These criticisms also apply to the Eisenson test [12] which was considered and rejected for the present study.

Thus a test was sought which, although giving a good clinical picture of the patient's difficulties and indicating areas requiring therapy, would be simpler to translate and adapt. The Sklar Aphasia Scale (SAS) [41] was chosen as being suitable.

A. The Sklar Aphasia Scale (SAS)

The SAS was published by Dr. Maurice Sklar in 1965. Details of this test have been given earlier in this chapter. It was chosen for use in this project because it required a minimum of alteration to comply with Israeli conditions and the Hebrew language, and was easily translated. The passages

provided to test reading comprehension are simple newspaper articles which the average Israeli is used to reading. The objects chosen for naming both orally and graphically are known ones in Israel and no changes were required. The words given for visual decoding were easily translatable and thus the SAS was usable with very few changes and did not provide a translation or adaptation problem.

This test has also been compared by McCloud [28] to three other aphasic tests and found to have a high correlation with these tests. McCloud compared the Sklar Evaluation Summary and three other aphasic tests on 12 post Cerebral Vascular Accident patients in order to assess: "(1) the ease of administration, (2) accuracy of interpretation of test items without placing too much responsibility of judgment on the examiner; (3) ease of scoring and objectivity of diagnosis; and (4) scoring which considers physical and behavioural factors. In addition, the responses of the 12 patients to each of the four tests were compared to establish degree of variability between test measurements." The three tests used for comparison with the SAS were the Schuell's Short Examination for Aphasia, Eisenson's Examination for Aphasia and Halstead-Wepman Aphasia Screening Test. In order to arrive at a mode of comparison each test was divided into four categories, viz auditory and visual reception, and oral and graphic expression. Each category was given a value of 25, for a total possible score of 100 for each test. A mathematical constant was computed for each category in each test. For example, in the Schuell test there were 44 test items in the auditory category. Each item was computed to have a value of 57 for a possible score of 25. There was found to be an extremely high degree of correlation between the four tests. The correlation coefficient between the results of the Sklar and other three tests was as follows: Sklar and Schuell an r of .974, Sklar and Halstead-Wepman an r of .845, Sklar and Eisenson an r of .917.

Since the SAS attempts to assess the overt residual language behaviour of aphasic patients, the communication theory concept was used by Sklar as the most appropriate method of classification. This theory

... affirms that a social communication occurs when a sign is (1) decoded (received and comprehended), (2) transcoded (transformed internally), and (3) encoded (transmitted orally or graphically) [44 p.7].

The SAS material is thus organized in four separate sub-tests, viz:

- (1) Auditory Decoding - These items measure auditory verbal comprehension and the patient is only required to respond with a gesture or by giving a motor response. The patient is tested on recognition of body parts, comprehension of overlearned words which are likely to be familiar to the patient, association of words to his environment, identification of common objects and memory span for visually presented objects.
- (2) Visual Decoding - The items presented include matching simple letters and words, testing word picture association, recognition of antonyms, simple arithmetic processes and silent reading comprehension and recent memory. These sub-tests require motor or pointing responses and attempt to test the patient's "ability to recognise and analyse different types of graphic signs usually acquired with formal learning" [44 p.4]. Normal adults with a fourth grade education can cope with these sub-tests.
- (3) Oral Encoding - samples areas of oral verbal process. Items previously presented for decoding are now presented for naming. The patient is required to describe a picture presented in sub-test (2) and to read and describe a short news item.

- (4) Graphic Encoding - tests residual writing ability of items presented previously in other sub-tests. Pictures of objects require labeling. The examiner dictates progressively longer sentences to be written and the patient is asked to write five sentences about the picture presented in sub-tests (2) and (3).

Scoring is as follows: When a patient responds without difficulty and correctly to an item, he is scored "0" which means no impairment. If he requires some assistance, he is scored "1" and no response or an incorrect response is scored "2".

Transcoding is affected by certain verbal behaviour such as jargon, perseverations, dysarthria, oral apraxia, dysphonia, etc. which the clinician is required to mark off on a check list provided by the SAS.

Sklar considers the score of "1" as being an indication of transcoding ability. A low transcoding score may either mean a very severe aphasia or very mild. A high score represents a transcoding difficulty. Each sub-test has a possible impairment score of 100 and a prognosis of retraining potential is made on the basis of the total impairment score obtained by dividing the sum of all the scores by 4.

It was felt that the Sklar Aphasia Scale would be a suitable, reliable test for use in this project.

B. Home Language Questionnaire (H.L.Q.)

The second test necessary for this study was a tool to measure the patient's ability in his home language before and after three months treatment.

The aim of such a test was to measure as accurately as possible the patient's ability to carry out activities at the request of a family member; to use everyday language; understand what he reads and is read to him; and write simple words. It was not practical to translate any known test into the many languages which it was predicted would be the home languages of the group to be studied. This would also have involved a testing problem as the tester would have had to be familiar with all the languages being used.

It was hoped to obtain a general picture of the patient's ability in his home language and also to have a means of comparing his condition before and after three months treatment. It was realised that this questionnaire would only give a superficial indication and could not be thought of as a true aphasic test but, under the circumstances, where the compilation of a test in eight or nine different languages was not feasible, the H.L.Q. was considered by the writer as being the only alternative.

A questionnaire was chosen as being the simplest diagnostic tool for a layman to use and one with which he may even be familiar. The writer decided on twenty questions as being adequate to give a general picture of the patient's difficulties in his home language. The questions were selected from items appearing in the SAS and the Eisenson tests. The latter test provides items such as clock setting and counting which were considered suitable for the H.L.Q. as they are easily observable. Items were taken from the SAS to provide a closer link between this test and the H.L.Q. In order to provide questions to test both encoding and decoding activities, the questions were analyzed and details of this analysis are provided in Appendix II. The writer attempted to evaluate auditory and visual encoding, graphic and oral decoding and the ability to carry out simple everyday tasks

such as counting. The patients' family were required to test the patient and thus questions had to be put simply and to require answers or actions observable by a layman.

In order to score the H.L.Q. the construction of a rating scale was considered. In constructing a rating scale it must be decided how many scale positions or categories are to be used. A basic consideration is the degree of differentiation wanted in the measurement. The most significant problem in the use of rating scales has to do with their validity. Investigators [41 p.356] have assumed that their rating scales were valid when the following conditions were obtained:

- 1) The attributes being measured were relatively objective so that their meaning would be uniformly understood by raters using the scale.
- 2) The ratings themselves were obtained under optimal conditions, including carefully constructed scales, trained judges and specified common terms of reference.

Under these conditions, one may not go too far wrong in assuming that if the obtained ratings are reliable, they are probably also valid [41 p.356].

A large element of judgement enters when a rater places an individual on a rating scale on the basis of his observed behaviour. In general, when devising a rating scale, procedures are sought which make it possible to place individuals on a scale with less likelihood of error. For this purpose standardised questionnaires are usually constructed. In this approach the individual does not directly describe himself in terms of his position on the dimension in question. Rather, he expresses his agreement or disagreement with a number of statements relevant to it; on the basis of these

responses he is assigned a score. Such a questionnaire, as described by Seilitz et al. [41] was devised for the Home Language Questionnaire, the difference being that the latter was not standardised.

The scoring of the questionnaire was done on a five point rating scale. The rating scale was chosen as being relatively easy to use and providing opportunity for as fine a discrimination as that of which the rater is capable [41 p.340]. The five point scale indicates a disability score. The higher the patient's score the greater his disability. On the five point scale a score of "No" was scored "5" and "Yes" was scored "1". A patient with a score of 20 was considered to have no disability. (See Appendix II for detailed questionnaire).

This test was of vital importance in the final decision whether or not to accept a patient for therapy in the present project. At times when the patient's knowledge of Hebrew had been poor prior to illness he may have scored results on the L.M.T.A. and SAS which would indicate an aphasic condition. When the patient showed no disability at all on the H.L.Q., he was not taken for therapy and his results on the L.M.T.A. and SAS were interpreted as being due to a lack of minimal knowledge in the Hebrew language.

Thus for the purpose of this study, all patients were tested on the Sklar Aphasia Scale in Hebrew and the Home Language Questionnaire in the appropriate language. All patients were also tested on the Language Modality Test of Aphasia which was one of the aims of the A.R.P.

Summary

The problem of test construction and administration in the field of aphasia has been briefly discussed. The development of aphasic tests was viewed as a background to a more detailed discussion of the tests devised by Luria, Wepman et al., Schuell et al., Eisenson and Sklar.

The factors influencing the choice of assessment instruments for this study were presented and the SAS and H.L.Q. discussed.

PART TWO

CHAPTER VI

PROCEDURES

The purpose of this study is to measure the effect of speech and language therapy, given in another language, on the home language of the bilingual or polyglot adult aphasic. As previously stated, the study undertaken by this writer was part of a larger study with a similar purpose, namely the Aphasia Research Project (A.R.P.).

I. HYPOTHESIS

It was hypothesised that therapy given in Hebrew, which was not the patient's home language, would nevertheless have a positive effect on the recovery of the home language. Such an hypothesis was based on the writer's observations of such patients over a period of five years. It was believed that recovery of language as such, and the psychological and emotional relief which this would afford the patient, aided in the recovery of his home language. It was further hypothesised that languages learnt at different times in a person's life would be stored in memory units in the same areas of the brain as the home language. Thus stimulation of Hebrew would aid in the retrieval of other languages, including the home language.

II. METHOD

A. Preliminary Procedures

1) The initial step was to find suitable diagnostic tests. For this purpose three tests other than the L.M.T.A. were considered. It was thought desirable to employ an independent test for the present study and not the L.M.T.A. which was being used in the A.R.P.

The tests considered were the "Minnesota Test for Differential Diagnosis of Aphasia" (Schuell [38]), "Examining for Aphasia" (Eisensohn [12]), and "Sklar Aphasia Scale" (Sklar [44]). Detailed consideration of these tests and reasons for the final selection have already been given in Chapter V. In deciding on the most appropriate test the writer had to take into consideration the following points:

- (a) Ease of adaption and translation into the Hebrew Language.
- (b) Length of the test. A long test was not considered desirable as all patients were being tested on the L.M.T.A. as well.
- (c) Test items requiring reading or writing of lengthy difficulty passages. As all of the patients only spoke Hebrew as a second language and several of them were expected to be illiterate in Hebrew, it was considered preferable to choose a test which tested functional language ability and did not overstress the ability to read or write.

After full consideration of all the above factors, it was decided to use the Sklar Aphasia Scale (SAS) [44].

2) A Home Language Questionnaire (which is discussed in Chapter V) had

to be devised as a means of measuring the patient's ability in his home language, prior to and after three months therapy. Items were sought which would be relatively easy to answer by members of the patients' family. Therefore they had to be easily observed functions such as: "Can the patient tell the time?" "Does he appear to understand news when it is told to him?" "Does he recognise colours?" The items were chosen from the SAS, and the Eisenson test and were supplemented by questions which the writer considered suitable for inclusion. In order to assure that a cross section of processes was being tested, the writer analysed each question. Details of this analyses are presented in Appendix II.

3) Therapy Aids. Pictures were sought which would provide large, clear representations of everyday objects, food, clothing and parts of the body. It was thought suitable to use pictures which had been devised for use with aphasics. Those provided in the Taylor and Marks Therapy Kit* were taken. Certain of the pictures were altered to meet local cultural needs, e.g. the newspaper picture was changed to one of a Hebrew paper. The words naming the pictures were translated into Hebrew. Other pictures were collected depicting various activities, to provide stimulus material for less severe aphasics. A set of plastic letters was acquired. Two Hebrew newspapers were chosen as providing simple reading material in large print and with adult content.

4) A pamphlet to the family of the Aphasic Patient was compiled by the writer and printed in Hebrew, French and German (See Appendix III). This pamphlet was based on a similar pamphlet prepared in Hebrew by Bar David [4] and supplemented by material taken from Schuell et al. [37 p.375], Van Riper [51] and from the writer's own clinical experience. It describes briefly the

* Taylor, M.L. and Marks, M.M. Aphasia Rehabilitation Manual and Therapy Kit, McGraw Hill, New York, 1959.

types of difficulties which the aphasic patient may encounter in understanding and expressing language. Advice is given to the family on how to help the patient cope with his difficulties and on how they should react to his condition. Mention is made of the handling of the patient when he is at home.

The purpose of this pamphlet was to describe the aphasic condition in simple language and to give general advice to the family. This was considered necessary for the following reasons:

- (a) Although advice was given to the family by the therapist, it was often forgotten because of the emotional stress under which the family found itself due to the patient's illness.
- (b) Many of the families were not literate in Hebrew and appreciated simple explanatory material in their own language.

5) Contact was made personally with the heads of Neurological Departments and Rehabilitation Departments at hospitals in the Haifa area and by letter to all doctors in this area. This was done in order to explain the project and enlist the cooperation of all the doctors concerned.

6) Forms were printed to be used by doctors to refer aphasic patients and for the therapist to record therapy plans and reports. The former were sent to heads of Hospital Neurological Departments and Rehabilitation Departments.

B. Subjects

Every patient referred by a doctor with a medical diagnosis of aphasia

was accepted for testing. Doctors referred patients by means of the referral form mentioned under preliminary procedures. This included details as to the physical diagnosis, eye sight and hearing, psychological condition, date of onset of illness, date of arrival in Israel and home language.

Doctors' definitions of aphasia varied and it was decided to accept all cases referred by a doctor for testing. It is also important to note that many doctors did not provide the details requested on the referral form and the therapist had to obtain the information when taking the case history.

Patients rejected for the project were:

- (1) Israeli born, Hebrew speaking patients.
- (2) Patients considered unfit physically or mentally to benefit from treatment.

Doctors referred all patients with aphasia to the project. If in discussion with the doctor, family or on first interview with the patient the criteria above were found to pertain, the patient was rejected for testing. In one case it was not possible for the doctors to decide on his mental state until after therapy was initiated. His response to therapy helped to formulate a diagnosis of mental instability.

Patients were treated at the following hospitals in Haifa:

- (1) Rambam Government Hospital.
- (2) Rothschild Municipal Hospital.
- (3) Yefe-Nof Nursing Home.
- (4) Elisha Private Nursing Home.

Treatment was continued with the patient in his own home until he had completed three months therapy.

Twenty patients were accepted as suitable for treatment. Fifteen other patients were tested but either did not receive treatment or received some treatment, but were not retested for the following reasons:

Three patients were rejected as unsuitable according to criteria above.

Six patients refused treatment.

Four patients died during treatment.

Two patients could not be retested due to illness.

The twenty patients studied in this project came from a variety of countries and cultural backgrounds. There were eight females and twelve males. The following tables indicate the distribution of countries of origin and home language.

TABLE I - COUNTRY OF ORIGIN, AGE AND SEX
(age is at time of 1st Assessment).

Country	Age	Sex	Marital Status
Algeria	39	F	M
Austria	62	M	M
Germany	46	M	M
"	60	F	D
"	54	M	M
Hungary	76	M	M
Iran	39	F	M
Iraq	62	M	M
"	56	M	M
"	40	M	M
Lebanon	34	F	M
Poland	64	M	M
"	63	F	W
"	47	M	M
Rumania	66	M	M
"	68	F	W
"	72	M	M
"	53	F	W
"	57	M	M
Russia	62	F	M
Total Subjects: 20		Total Males: 12	
Mean Age: 56		Total Females: 8	

Summary

Country	No. of Patients
Algeria	1
Austria	1
Germany	3
Hungary	2
Iran	1
Iraq	3
Lebanon	1
Poland	3
Rumania	4
Russia	1
Total	20

TABLE II - HOME LANGUAGE DISTRIBUTION

Home Language	No. of Patients
Arabic	4
French	2
German	4
Hungarian	2
Polish	2
Rumanian	3
Yiddish	3
Total	20

The women from European countries were in general well educated, could read and write in their home language and to some extent in Hebrew. The women from North Africa and Arab countries were less well educated and one was illiterate. Of the twenty patients, eight were female and five came from European countries.

The twelve males treated were all literate in their home languages.

All the males had learnt some Hebrew as the language of prayer but this does not mean that they understood what they read. Three patients had had formal lessons in Hebrew either in Israel or in their country of origin. The average age of the group was 56. The youngest patient was a female aged 34 and the oldest a male aged 76.

The number of years that the patients had been living in Israel was as follows:

TABLE III - PERIOD OF RESIDENCE IN ISRAEL.

Case No.	No. of Years in Israel	Age of leaving Country of Origin
1	17	49
2	13	49
3	20	48
4	35	29
5	20	56
6	36	27
7	6	33
8	20	19
9	28	18
10	16	18
11	18	54
12	16	37
13	30	30
14	22	25
15	29	25
16	17	39
17	44	18
18	18	22
19	34	23
20	34	28

S u m m a r y

No. of Years in Israel	No. of Patients
less than 10 years	1
11-20 "	10
21-30 "	4
31-40 "	4
over 40 "	1

The educational status of these patients was as follows:

TABLE IV - EDUCATION RECEIVED (IN COUNTRY OF ORIGIN)

No. Years of Schooling	No. of Patients
Illiterate	1
1 - 5 years	3
6 -12 "	13
University or equivalent	3

Analysis of the patients' occupations revealed the following facts:

TABLE V - OCCUPATIONAL STATUS

Occupation	No. of Patients
Housewife	7
Labourer, carpenter, banker	5
Merchant	3
Engineer, accountant	2
Clerk	2
Teacher	1

The following neurological diagnoses were made:

TABLE VI - NEUROLOGICAL DIAGNOSIS

Neurological Diagnosis	No. of Patients
C.V.A.	15
Embolism	3
Trauma	1
Tumor (Benign)	1

The elapse of time between the onset of illness and the first testing of the patient is shown in Table VII

TABLE VII - PERIOD BEFORE TESTING (AFTER ONSET OF ILLNESS)

Length of Time After Commencement of Illness	No. of Patients
2 weeks	6
1 month	7
6 weeks	3
2 months	3
5 months	1

C. PROCEDURE

The twenty subjects used in this study were tested, and retested after three months therapy on the SAS. Eighteen of the subjects were also tested and retested by an independent examiner on the L.M.T.A. The two patients not tested on the L.M.T.A. did not respond to the screening test and thus were not given the complete test. Testing took from 1/2 to 3/4 hour depending on the severity of the aphasia. The use of the L.M.T.A. was part of the A.R.P. but the results were used as a control on the SAS for the present study, and are presented together with results on the SAS and H.L.Q. in Chapter VIII, where they are considered statistically.

In the following chapter, where each case is discussed individually, mention will be made of the time lapse between the administration of the three tests. In general, it was attempted to proceed in the following order:

- (1) Case history
- (2) SAS
- (3) H.L.Q.
- (4) L.M.T.A.
- (5) Providing family with pamphlet
- (6) Plan treatment on a monthly basis.

The case history always preceded testing. Details were obtained from the patient's hospital file and supplemented by information gained from the family. Of special significance for this study were the following:

- (a) Medical diagnosis (including date of onset of present illness, other illnesses, vision and hearing, mental and emotional condition)
- (b) Country of origin and home language.
- (c) Period of residence in Israel.
- (d) Former education with details of Hebrew education (where learnt, level of knowledge).
- (e) Occupation

Procedures 2, 3 and 4 above were carried out on consecutive days. With some patients the L.M.T.A. was given 24 to 48 hours later. This procedure was not always possible. The patients being tested were all sick people whose general condition varied from day to day and often during different periods on the same day. A test was often postponed due to the patient's poor general condition.

Schuell et al. [37 p.159] mention the inconsistency of responses as one of the criticisms against systematic testing of aphasics. It was not considered of vital importance by this writer whether the L.M.T.A., SAS or H.L.Q. were presented first, as it was not believed that the patient would

of necessity improve through learning by the time the second or third test was given. In fact, a patient could regress slightly by the time the second test was given or not respond as well because of a deterioration in mood.

The H.L.Q., presented several difficulties. It was found very difficult for the families to decide on the right position on the five point scale, and the therapist at times had to make this judgement for them. Very few families were able to really judge whether or not the patient understood material read to him. All H.L.Q. results are very subjective. The method of administering the H.L.Q. was as follows: A member of the patient's family or a member of the hospital staff when the family was not available, sat with the therapist and the patient. The therapist explained that each of the questions could be answered by either "yes" or "no", "seldom", "sometimes", or "often", each with a slight difference in degree. The therapist then read the question softly to the family member in Hebrew and told him to ask the patient the question in the home language. The therapist and family member then discussed the most appropriate rating for the patient on that particular question.

Each family was given a copy of the pamphlet "To You the Family of the Adult Aphasic Patient" after completion of the H.L.Q.

In planning therapy for each patient his remaining abilities and his future communication needs were taken into account. It was hoped that realistic goals would be set. Therapy was started at a point where the patient could respond and cooperate.

All patients treated in hospitals were also receiving physiotherapy and occupational therapy. The decision to start treatment was taken in

consultation with the doctor and above mentioned therapists. At all times this team work was stressed. In deciding on commencement of treatment the patient's physical strength, willingness and ability to cooperate were considered by the team.

Even in patients who responded better to visual stimuli a great deal of auditory stimulation was given, as this writer found by experience that Schuell et al. [37 p.338] are correct in their statement that the first principle of treatment is auditory stimulation although not necessarily through auditory channels alone.

Each patient received three months therapy free of charge both while in hospital and later at home. Each therapy period was approximately 1/2 hour three times a week given in a private room. There were two patients who, because of the mildness of their condition, received one months treatment after which time they felt sufficiently rehabilitated to cease having treatment.

After a period of three months all patients were retested both on the SAS and H.L.Q., and were dismissed or referred elsewhere for further treatment.

Problems

1) Because of the conditions in Israeli hospitals where it is impossible to keep a patient hospitalised longer than is absolutely necessary, there was always an urgency to take a patient as soon as possible for fear of his leaving the hospital before having treatment.

Vignolo [44] believes that a patient evaluated early after the onset of illness will have the greatest capacity to benefit from speech therapy. Nevertheless, Schuell et al. advise waiting a few weeks after the C.V.A. or trauma in order to obtain the most accurate results in testing [37 p.160]. Although it is not possible to predict the rate or limits of the spontaneous recovery which will take place in the first few weeks, they believe in waiting until the patient is neurologically stable before testing. This was not always possible in the present study.

2) It had been hoped to have a larger sample but because of the high percentage of patients who could not complete the three month programme, and because of the difficulties experienced in finding suitable patients a smaller sample was taken.

CHAPTER VII

CASE DISCUSSIONS

In this chapter the writer will present details of test results and briefly discuss the therapy programme carried out with each patient. In treating these patients the writer adhered to the philosophy expressed in Chapter IV, of treating the case as an individual, not labelling him and trying to find the best therapy technique to suit each patient. In the case descriptions which follow, the writer will discuss each case under the following headings:

- 1) Case history
- 2) Test results
- 3) Aims of therapy and progress made
- 4) Retest scores

Test and retest results obtained with 18 of the patients on the L.M.T.A. have been included. These results apart from providing further information about the patients in a test situation, will also be used as a control on the SAS results. These results will be considered statistically in Chapter VIII. In this chapter the SAS disability scores are given in percentages whereas in Chapter VIII the total scores will be given.

No L.M.T.A. results are given for patients no. 1 and 2 as the examiner was not able to obtain responses from them.

The patients taken in this study will be divided into four groups according to the initial test results on the SAS as follows:

Group I	-	91	-	100%
Group II	-	61	-	90%
Group III	-	31	-	60%
Group IV	-	11	-	30%

The above scores represent a degree of disability, i.e. the higher the score the greater the disability. All males in the study had learnt Hebrew as a prayer language and both males and females had learnt Hebrew informally from day to day living unless otherwise stated.

GROUP I

Case I (F.K.)

F.K. was a male aged 66, born in Rumania and living in Israel for 17 years. His home language was Hungarian and his knowledge of Hebrew prior to illness had been limited. He had not been able to read in Hebrew but was literate in German, Rumanian and Hungarian. By profession he was a baker. He had suffered a C.V.A. at the end of December 1967 and was first tested on 4th February, 1968.

On examination, he appeared to have an oral apraxia and tongue movements were very poor. Test results on the SAS showed a disability score of 90% with oral encoding being totally impaired. The score on the H.L.Q. was 79. Both tests were given on the same day. The patient was able to recognise the names of his family and friends. He was not tested on the L.M.T.A. as he could not respond to items on the screening test.

As he was unable to phonate, therapy was initiated with the achievement of phonation as the main aim. The second aim was to improve auditory decoding

in the belief that intense auditory stimulation would aid in phonating and achieving words. Basing therapy on suggestions given by Schuell et al. [37 p.349] the patient was encouraged to vocalise and produce vowel sounds. He then progressed to /m/ and a few lessons later to /ma/. In accordance with Wepmans's regression hypothesis [58], it was attempted to lead him into a babbling stage and jargon prior to words. The patient perseverated on /ma/. Words starting with these ~~letters~~^{speech-sounds} were attempted with little success. At all lessons, the patient was given exercises in pointing to a number of objects on the table in front of him. He continued finding this difficult until the tenth lesson. When he was able to recognise objects, an attempt was made to introduce pictures for recognition. It was also attempted to sing with him. He was able to sing tunes to /ma/ but became very emotional and cried easily. Patient was encouraged to count in unison with the therapist from 1-5 and to attempt to imitate the rhythm of simple words. Very little progress was made and it was decided to concentrate on writing to enable the patient to have some form of communication. He copied the numbers and wrote his name in Latin letters.

On retesting, this patient was found to have come down 26% in his disability score on visual decoding and 12% on graphic encoding. There was little difference on test and retest scores on other items. The impairment scores on test and retest were 90% and 79%. Prognosis was considered to be poor. On the H.L.Q., the patient only improved by 5 points. Both tests were given on the same day.

Case 2 (S.S)

Case No. 2 was a male aged 62 of Iraqi origin who was a laundry worker prior to illness. He suffered a C.V.A. one month before being referred for

in the belief that intense auditory stimulation would aid in phonating and achieving words. Basing therapy on suggestions given by Schuell et al. [37 p.349] the patient was encouraged to vocalise and produce vowel sounds. He then progressed to /m/ and a few lessons later to /ma/. In accordance with Wepmans's regression hypothesis [58], it was attempted to lead him into a babbling stage and jargon prior to words. The patient perseverated on /ma/. Words starting with these ~~letters~~ ^{speech-sounds} were attempted with little success. At all lessons, the patient was given exercises in pointing to a number of objects on the table in front of him. He continued finding this difficult until the tenth lesson. When he was able to recognise objects, an attempt was made to introduce pictures for recognition. It was also attempted to sing with him. He was able to sing tunes to /ma/ but became very emotional and cried easily. Patient was encouraged to count in unison with the therapist from 1-5 and to attempt to imitate the rhythm of simple words. Very little progress was made and it was decided to concentrate on writing to enable the patient to have some form of communication. He copied the numbers and wrote his name in Latin letters.

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Case 2 (S.S)

Case No. 2 was a male aged 62 of Iraqi origin who was a laundry worker prior to illness. He suffered a C.V.A. one month before being referred for

for treatment with a right hemiplegia and severe aphasia. He spoke Arabic at home and had been in Israel for 13 years.

On the SAS he had an impairment score of 91% with 100% impairment in oral encoding. He scored 80 on the H.L.Q. Both tests were given on the same day. No phonation was possible. He was not tested on the L.M.T.A. as he failed to respond to the screening items.

Treatment was aimed at achieving phonation initially. The patient was very depressed and withdrawn and showed no emotional reactions. After five lessons he was still unable to phonate, only cough. He was able to match forms on card 5 of the Minnesota Test and to copy these forms. This test item was used as a therapy aid for this patient and not for testing purposes. On attempting to write, he was able to write numbers 1 to 10, with several perseverations. It was decided to show him words in an attempt to initiate phonation. This aided him in phonating and he managed to say /a/. No further speech was achieved during the full three months treatment. Every session was started with auditory stimulation to improve auditory decoding with objects. Very little progress was made in this sphere. The patient became very upset during the course of therapy and cried at most of the lessons. He had a wild, frightened look in his eyes. It was decided after six weeks therapy to concentrate on the patient's ability to copy written words and try to develop spontaneous writing. Very little progress was made.

The patient was retested on the SAS and H.L.Q. on the same day. On the SAS retest, he scored 94%. The H.L.Q. showed an improvement by 2 points dropping from 80 to 78.

Case 3 (S.M.)

Case 3 was a woman aged 68, born in Rumania and having immigrated to Israel 20 years previously. She suffered a C.V.A. in November 1968 and was referred for treatment two months later with a right hemiplegia and severe aphasia. Her education consisted of four years in primary school and she had been unable to write Hebrew prior to illness. Yiddish was spoken at home.

On the SAS, she scored 93% impairment with 100 in oral encoding. On the H.L.Q. she scored 85 and on the L.M.T.A. 412. The L.M.T.A. was given two days after the other two tests.

Work was started on improvement of auditory decoding. The patient was asked to match objects and much time was spent in teaching her to understand and carry out simple commands such as "give me ...". Sentences were used to help increase cues such as "where is the pencil?".

It was hoped that by combining commands with objects, the patient would learn to use the words in a useful linguistic form, as outlined by Scargill [35]. After three months of treatment a slight improvement was noticed by the therapist in the patient's co-operation, alertness and understanding. This improvement is not reflected in the test results.

The patient scored 93% on the SAS retest. The same as she had achieved on the initial test. The H.L.Q. showed a drop from 85 to 81. No speech was achieved but only a certain number of jargon words on which the patient perseverated. L.M.T.A. retest score was 405. The H.L.Q. and L.M.T.A. were given one day before the SAS.

Case 4 (A.K.)

Case 4 was a male aged 64 of Polish origin. He had been a merchant prior to illness and was married for the second time. He suffered a C.V.A. with right hemiplegia two weeks before being tested. He had been literate in German and Hebrew, and had lived in Israel for 34 years when first tested.

On testing he scored 91½ on the SAS and 84 on the H.L.Q. He scored 100 on oral encoding, 94 on graphic encoding and 84 on visual decoding, but his understanding was not so severely impaired. On the L.M.T.A. he scored 341. The SAS and H.L.Q. were given on consecutive days and the L.M.T.A. three days later.

At the start of therapy, the patient was emotional and cried easily. He had some jargon but no speech. In attempting words, he only achieved noises with his lips and a type of click. The first aim in therapy was to achieve some meaningful phonation by making use of whatever sounds he could vocalise and developing them into words (Schuell [37 p.350]). By pressing his lips together he was able to say "m-m" and then "ma". Objects and later pictures were chosen which began with /m/. Words were also attempted with /a/. Objects and pictures were used for stimulation. The writer concentrated on auditory plus visual stimuli with the main emphasis on the former. The word was said five times by the therapist and then attempted by the patient while watching himself in the mirror. Attempts were made to re-establish automatic speech such as counting and singing familiar songs. The patient was able to write numbers spontaneously after eight lessons and was instructed to say the numbers as he wrote. In order to start words with initial consonants other than /m/ and /n/, the motor kinaesthetic method was used. In this way labials were achieved and then /t/ and /d/. At this stage,

the names of the patient's family were introduced. The patient began imitating further sounds and found that hearing and seeing the word at the same time facilitated his articulating the word. This had been mentioned by Schusll et al. [37 p.338]. From the tenth lesson the patient was able to follow reading of simple sentences and later to read together with the therapist from an easy newspaper. It was also attempted to get him to write words sounding them out as he did so. The patient's auditory memory span was still weak and exercises were given to train him to retain the names of objects in the room or numbers, and then to point to the objects or write the numbers. Simple arithmetic was also exercised. The patient was now at home and alone with his wife who spoke only German to him. She was convinced that she could teach him on her own. On the other hand, she was constantly complaining of ailments and staying in bed with only the patient to look after her. The patient reached a plateau and showed no improvement for a few lessons. It was decided to devise a simple form of teaching machine to provide auditory stimulation in Hebrew and the necessary practise between lessons. A tape recorder was chosen with only four different coloured buttons to work it. A lesson was recorded by the therapist with intervals on the tape to allow for the patient's response. One part of the lesson required the patient to read sentences from his exercise book together with the recording. The patient was taught how to manipulate the tape and repeat parts of the lesson when necessary. It was regretted that a proper teaching machine, as outlined by Appel [3], was not available to help overcome the reduction in auditory memory span. During lessons, attempts were made to improve the patient's auditory recognition of letters before writing them (Luria [23 p.182]).

After 32 lessons, the patient showed an improvement in all items on the SAS with a score of 51 and a reduction of disability on the H.L.Q. of 30

points, but from the practical point of view, he did not have sufficient verbal language for every day communication. His retest score on the L.M.T.A. was 242. He was tested on the SAS and H.L.Q. two days after the L.M.T.A.

Case 5 (Y.H.)

Case 5 was a male aged 76, born in Hungary and living in Israel for 20 years. He had been able to read and write Hungarian and German but his literary knowledge of Hebrew was limited to reading prayers. He could speak Yiddish and some Hebrew. He had been a labourer before retiring and had suffered a C.V.A. one month before being tested. He was hard of hearing in the right ear.

He scored 90% on the SAS, 53 on the H.L.Q. and 420 on the L.M.T.A. which was administered three days after the other two tests. Oral encoding and verbal decoding were most severely affected. He was confused, depressed and labile when therapy was started.

The aim of therapy initially was to elicit naming of simple objects by using loud auditory stimuli and emphasizing visual stimuli. Easy automatic speech, such as in counting and singing, was encouraged in order to improve the patient's mood and increase confidence. This has been discussed by Agranowitz and McKeown [1 p.103]. Writing was started from the beginning of treatment. The patient was able to write numbers spontaneously and to copy his name, address, etc. At times, the patient perseverated both orally and graphically. Techniques were used to help him overcome this. The patient was asked a question to which the perseverated word would be an appropriate answer and then the subject was changed and cues were given

for a different word. This often helped him to break the perseveration. Observing the therapist's face and then his own in the mirror was a useful visual cue in initiating oral responses. Reading was used and provided an added interest for the patient. It was found that hinting at the first letter of a word did not help this man at all. Luria [26 p.399] has described such a difficulty and believes that it is caused by a lesion in the extra-auditory divisions of the left temporal lobe. The patient's voice was very soft and weak from the outset. With encouragement, he was able to improve the vocal loudness which helped him to communicate. There appeared to be many periods of regression during treatment, when the therapist then took the patient back to easier tasks such as counting in order to overcome his emotional crises and increase self-confidence.

On retesting, this patient scored 64% on the SAS and 27 on the H.L.Q. His retest score on the L.M.T.A. was 263. This test was given two days after the SAS and H.L.Q.

Concluding Comments on Group I

All five patients in this group were over 60 years old and had suffered a C.V.A. The first three patients had had very limited general education. Cases 1 and 3 achieved vocalisation and perseverated on the jargon they were able to produce. Case 2 did not even reach this stage. Cases 4 and 5 were able to produce words and made the most progress, apparently due to their superior auditory decoding ability from the outset. But Case 4 continued to have difficulties in distinguishing between different speech sounds to the end of the period of treatment.

Tkachev et al. [49] believe that the patient will only recover speech

when he is able to differentiate between various speech sounds. This was not achieved with Group I patients.

Wepman and Lyle [58] state that one cause of failure with global aphasics is that too much has been expected of them in therapy. They believe that in accordance with their regression theory, a patient should be made to move progressively through various stages of language, e.g. the global patient to use jargon, the jargon patient to use words. This was attempted with all the patients in this Group with little success. It should, however, be emphasised that Cases 1 and 2 did not pass the screening stage of the L.M.T.A. and thus would not have qualified for treatment by Wepman and Lyle. They were, however, included in this study as the families were anxious to do everything possible, and the patients were co-operative and showed that they wanted treatment. A major problem with these patients was to decide when to abandon one technique and try something new. The therapist was limited to a three month period of treatment and in two of the cases had to make the decision to change the emphasis from the achievement of speech to the written word. The aim with all five of the patients was to open up a channel of communication with those around them. This was unsuccessful in three out of the five patients. No avenue of entry into the patient's consciousness (Wepman [55 p.247]) was found in Cases 1 and 2.

GROUP II

Case 6 (M.L.)

Case 6 was a female aged 63, born in Poland and having immigrated to Israel in 1932. She was a widow and a housewife prior to illness. She had

had eight years of schooling and spoke both Polish and German.

M.L. was tested on the SAS and H.L.Q. two days after the L.M.T.A., and was first seen six weeks after being admitted to hospital with suspected narrowing of the carotid artery causing aphasia. Her SAS score was 76% with her major problem being visual decoding. She scored 64 on the H.L.Q. and 289 on the L.M.T.A.

At the outset, auditory and visual stimuli were used to get the patient to name objects and then pictures. At a later stage, she was also asked to write the names of objects. Therapy was given to increase her awareness of her surroundings and to help her recognise and name objects, furniture, clothing and body parts. Exercises as described by Agranowitz and McKeown were used [1 p.77]. This patient was very aware of her handicap and seemed confused by her inability to make sense when speaking. She was able to use sentences and attempted to carry on a conversation although her thought processes were not always logical or coherent. She lived alone and was retarded in her progress by her lack of stimulation and opportunity to practise at home.

On retest she scored 74% on the SAS, 59 on the H.L.Q. and 261 on the L.M.T.A. Her main disability on the verbal level was in describing pictures or events in understandable sentences. The SAS was given two days after the L.M.T.A. and H.L.Q.

Case 7 (H.H.)

Case 7 was a female aged 39 who suffered a depressed skull fracture and left parietal decompression after being hit on the head by her husband

during a quarrel. She had immigrated to Israel six years previously and had had six years schooling in Bagdad, her place of birth. Her home language was Arabic. She had taught herself to read and write Hebrew and was anxious to perfect her knowledge. The mother of six children, her main occupation prior to illness had been housekeeping and helping her husband on the agricultural holding on which they lived. She was anxious, depressed and a little disorientated when tested.

She was first tested on the L.M.T.A. and H.L.Q. twelve days after the onset of the aphasia and four days later was given the SAS. She scored 72% on the SAS with a high disability score in graphic encoding and a low score on auditory decoding. On the H.L.Q. she scored 45 and 305 on the L.M.T.A.

Therapy was initiated with the main aims being to improve the patient's reading and writing ability, to help overcome a slight articulatory difficulty and verbal perseveration and to improve the patient's depressed mood. Therapy was given twice weekly with patient No. 8 who shared a room with her. Although their communication needs were very different, they were able to help each other emotionally. The third lesson each week was an individual one when the therapist concentrated on the patient's writing difficulties. Progress was very rapid. By the 12th lesson the patient was reading fluently and writing spontaneously. This case tried to circumvent words which were difficult for her and was helped to use these words as cues for the correct word as described by Berman and McLean [6]. She was highly motivated to improve her writing ability as she wanted to write letters to her son in the army. As her speech difficulties lessened, the patient became more difficult to handle and showed aggressive traits. During the early stages of treatment, therapy had to be temporarily inter-

rupted when the patient had an abortion.

The L.M.T.A. was given four days before the SAS. She scored 120 on the L.M.T.A. and 11% on the SAS. On the H.L.Q. which was given two days later she scored 24. It was felt by the writer that much of the patient's initial improvement was due to spontaneous recovery. The prognosis was thought to be good at the outset because of the etiology of the condition and the patient's age.

Case 8 (D.B.H.)

Case 8 was a female aged 39, born in Algeria and having been in Israel for 20 years. She was a housewife and the mother of four and was illiterate in Hebrew. She had been suffering from a mitral stenosis and auricular fibrillation which led to a cerebral embolism three weeks before being tested. She had right facial paralysis and a right hemiplegia.

On the SAS she scored 79% and on the H.L.Q. 69. These tests were given on the same day. The L.M.T.A. was given five days previously and she scored 420. Her understanding was only mildly impaired but her oral encoding disability was total. Graphic and visual scores were influenced by her illiteracy in Hebrew.

The primary aim in initiating therapy was to obtain phonation. Suggestions given by Schuell et al. [37 p.349] were used for this purpose. The patient began by imitating the rhythm of words. She was hampered by dysarthria and exercises were given to improve tongue and lip movements. When she was able to produce /m/, a programme of vocabulary building was started using names of objects starting with this letter. Pictures were

used for visual stimulation. The patient made very good progress and was soon using words and then imitating simple sentences. Mirror work proved to be of help to her in improving articulation. Action pictures were used for description and sentences were encouraged. Group sessions were held with Case No. 7. She was a more assertive, aggressive personality with no inhibitions in speaking, even with faults. She encouraged Case No. 8 and helped her to improve her vocabulary between lessons. Her condition was also explained to her children who helped her on her visits home.

Retest results showed a score of 44% on the SAS and 41 on the H.L.Q. which were given on the same day. On the L.M.T.A. given two days earlier she scored 229.

Case 9 (E.K.)

A 46 years old male of German origin who had been in Israel for 28 years. His nine years schooling was received in Germany but he had learnt Hebrew formally on his immigration to Palestine. He had worked as a clerk prior to illness. When first seen for testing, he had suffered his fourth C.V.A. about three weeks previously. His speech had not been affected after the first three strokes. He was in a state of depression and cried throughout the test.

He scored 79% on the SAS and 79 on the H.L.Q. given on the same day with a score of 298 on the L.M.T.A. three days later. Oral encoding was totally impaired except for his ability to repeat the word "eye" in Hebrew. His graphic encoding was also seriously affected. The best score obtained was on auditory decoding.

The aims of therapy were to improve decoding ability by getting the patient to match words to pictures and to develop a working vocabulary to enable the patient to communicate with his surroundings, and thus decrease frustration and alleviate depression. At the start of treatment, the patient was better able to match words to pictures than point to objects in the room. He was reluctant to attempt phonation and when he did, he made a great effort. He had previously undergone voice therapy and attempted to overcome his aphasia disability by applying his rules of breathing exercise to no avail. Writing was started from the third lesson. He was able to copy his name and address and numbers which he then attempted to read. The patient was irritated by attempts to help him regain words by giving him the first sound - Luria [26 p.399] has described cases in which the prompting was of no help and this case appeared to be one of them. He gradually began to use a jargon speech which the therapist accepted as being a step towards communication. With the development of jargon, the tension seemed to be slightly released. From the jargon he progressed to words. This would appear to be in accordance with Wepman and Lyle's "regression hypothesis" [58]. The patient showed a great interest in reading and writing, and would not take part in any other rehabilitative programmes at the hospital. An attempt was made to use large plastic letters to aid the patient in achieving spontaneous writing but he refused to cooperate. He was very wilful and determined to try only those activities which he felt could help him. He was very intolerant of his wife and preferred not to have her assist him. The relationship between them had not been favourable prior to his illness. Towards the end of the three months treatment, a new method was attempted which the patient preferred and he achieved better results. The patient was required to say a word with the aid of the mirror and auditory stimulation from the therapist (Luria uses this method - [23 p.183]). He then

attempted to write the word while the therapist continued to sound out the letters for him. His dictation began to improve although he frequently reversed letters. He found it helpful to concentrate on group of words starting with the same letter combination. This has been described as a means of revealing lost 'internal word patterns' by Luria [23 p.204]. Reading a simple newspaper in unison with the therapist helped him.

On testing, the patient scored 43% on the SAS and 44 on the H.L.Q. There was an improvement in all subtest items. His L.M.T.A. retest score was 177. The L.M.T.A. was given five days before the SAS and H.L.Q.

Case 10 (R.A.)

A woman aged 34 of Lebanese origin. She had undergone a 'ronto-parietal crainotomy for the excision of a benign tumour six weeks before being referred for testing. Her formal education had ended at the age of 14 due to a severe burning accident. She was the mother of two girls and a housewife. She was able to read and write simple Hebrew prior to the operation. On being examined she was found to have a right hemiplegia, was very underweight and weak physically.

She scored 61 on the SAS with a low disability score in auditory decoding and a high score on oral and graphic encoding. This test was given three days before the L.M.T.A. and six days before the H.L.Q. On the H.L.Q. her score was 63 and on the L.M.T.A. she scored 256.

The aim of therapy was to encourage development of vocabulary through auditory stimulation and to start working on choral reading and writing, when the patient was strong enough for these activities. Objects in the

room and the patient's food were used initially, and it was found that with the slightest prompting she was able to articulate a word similar to the one indicated by the therapist. From the outset, emphasis was laid on sentences and not isolated words. This is in accordance with Scargill [36] and proved to be very useful with this patient. By the fourth lesson, she was reading with the therapist and attempting with help to relate what she had read. She also started writing her name, address, numbers and words. After working on simple pictures she began describing action pictures. Her speech showed many dyslalic elements. She found /v/ very difficult and substituted either /b/ or a sound influenced by a previous phoneme, e.g. "Tel-Avil" instead of "Tel-Aviv". Her understanding of political topics and her general attitude and behaviour did not seem to reflect a similar regression in her behaviour as is described by Wepman [38]. The patient was reluctant to use a mirror because of her deteriorated physical appearance and so motor kinaesthetic aids were given to enable her to improve articulation. Sentences were encouraged at each lesson. Her automatic speech as shown in counting, naming days of the week etc. improved rapidly but by retest date she still had many distortions and substitutions although was attempting to use sentences.

Her retest score on the SAS was 37% and 39 on the H.L.Q. On the L.M.T.A. she scored 160. The SAS was given two days after the L.M.T.A. and the H.L.Q. two days later.

Concluding Comments on Group II

Group II patients included four young cases ranging between the ages of 34 and 46, two of whom had suffered trauma or surgery. Their prognosis

from the outset was better than those in Group I. It is believed by this writer that Case No. 7 made an almost entirely spontaneous recovery. Osgood and Miron [31 p.33] state that in the early stages after trauma or surgery spontaneous recovery is due in part to recovery from the "... physiological effect of edema ...". This would seem applicable to Case No. 7. All the patients in this group had had a good spoken knowledge of Hebrew prior to illness. With the exception of Case No. 6, who had very little motivation to improve and little opportunity to practise as she lived alone, the rest of this group made good progress.

GROUP III

Case 11 (M.O.)

A male aged 72 of Rumanian birth and having lived and worked in Israel as a merchant for 18 years. His spoken Hebrew was adequate prior to illness but reading and writing had been weak as the patient had been able to carry on his business in Yiddish and Rumanian. He had also spoken French. He was seen by the writer a month after suffering a C.V.A. which left him with a right hemiplegia.

On the SAS he scored 39% and 33 on the H.L.Q., with a score of 173 on the L.M.T.A. All modalities were equally affected and the patient had some dysarthria. The L.M.T.A. was given first, followed by the SAS two days later and the H.L.Q. two days afterwards.

Therapy was initiated with exercises to improve tongue and lip movements. The patient was also encouraged to develop his language ability by

describing pictures in full sentences. Several times he was able to give the word in French but not in Hebrew. Therapy was given to aid the patient in reading and relating short paragraphs on topics of interest to him. He was treated with Case No. 12 for five lessons before the latter left the hospital. Both being of Rumanian origin, it was found that their common background was a bond. They discussed Rumania and Rumanian food. The patient was advised to practise exercises to improve his dysarthria between lessons. Although this patient was able to name certain objects and articles of clothing in Rumanian, he was not sure of the names in Hebrew and was helped to learn them. For this purpose pictures were used with labels. Towards the end of the three months, the patient was able to discuss politics in Hebrew.

He was retested on the H.L.Q., then the L.M.T.A. and SAS with a two days interval between tests. His retes on the SAS showed a score of 22% with an improvement in all scores. On the H.L.Q. he scored 21 and 96 on the L.M.T.A. This patient was one of the few whose home language interfered with his re-acquisition of speech in Hebrew. It is believed that the fact that Yiddish and Rumanian were used daily in the patient's life before illness influenced their improvement.

Case 12 (P.P.)

A widow aged 53 who was born in Rumania and had been in Israel for 16 years when she suffered a C.V.A. She also suffered from diabetes. She was left with a right hemiparesis and aphasia.

On testing, she scored 43% on the SAS, 55 on the H.L.Q., and 200 on the L.M.T.A. The SAS and H.L.Q. were given on the same day and the L.M.T.A.

four days later. Auditory decoding was hardly impaired and the highest disability score was obtained on graphic encoding. This score may have been influenced by the patient's poor knowledge of Hebrew reading and writing previously.

She was in a depressed state from the start of therapy but was co-operative. It was decided to aim at increasing her spoken and written vocabulary and encourage her to use sentences. For this purpose pictures were used as stimulation. Initially she was asked to match words to pictures and later to copy words and attempt to write words spontaneously. She showed difficulty in recognising pictures but this ability improved with treatment. She was encouraged to talk about everyday activities, such as her meals. In order to improve writing ability work was done on auditory recognition of letters of the alphabet [37 p.360]. Emphasis was placed on sentences rather than words in the belief that language has to be restored and not just vocabulary. Scargill [35] writes of the patient being taught in a useful language form and Luria [23 p.148] stresses the use of sentences. From about the tenth session, the patient's mood improved. She showed enthusiasm for describing magazine pictures and for reading newspaper articles which was started at this stage. Work was also started on communication needs at home, such as shopping. The patient's last five lessons were given together with Case No. 11 who was also from Rumania. At this stage of treatment they were able to carry on a simple conversation and discuss Rumanian food, describe pictures and read together from a simple newspaper. The group therapy had a positive affect on this patient and improved her depressed mood.

On retesting, she scored 33% on the SAS, 29 on the H.L.Q. and 155 on the L.M.T.A. which was given four days before the other two tests.

Case 13 (P.B.)

A divorcee aged 60 who was born and educated in Germany. She had completed high school and had continued learning singing at a music conservatoire. Apart from German, she had spoken French, Italian and English but her Hebrew had been weak, although she had been in Israel for 30 years. She had suffered a cerebral embolism six weeks before being tested and was left with a transient right hemiplegia.

On testing she scored 52½ on the SAS and 55 on the H.L.Q. and on the L.M.T.A. 365. The SAS and H.L.Q. were given on the same day and the L.M.T.A. four days earlier.

She was confused and disorientated and had a slight oral apraxia. Her highest disability score was on oral encoding. Therapy was initiated with improvement of the oral apraxia as the main aim. When the patient concentrated on imitating a sound of a word, she was unable to do so but was often able to say a word spontaneously. Writing and reading were used as a means of stimulating speech. All oral attempts became like a singing lesson. She tried to phonate vowel sounds by singing them. In this respect, she resembled Case No. 9 who had also had voice training at an earlier stage in his life. For both patients this proved to be a disadvantage. The writer avoided asking the patient to imitate words as this led to frustration and forcing. Schuell [37 p.264] believes that patients should not be allowed to struggle on words. Instead, she was asked to match words to pictures and write words which she attempted to say while writing. After a few lessons, the writer increased the auditory stimulation and allowed the patient to imitate words orally after hearing them five times - Schuell [37 p.353]. The patient began developing spontaneous speech in German and

sometimes came out with a phrase in English. It was difficult to hold her attention during lessons. She continually jumped up to look for something and had to be brought back to the lesson. The patient, nevertheless, made some improvement. Work was done on reading in unison and conversational speech. She began using Hebrew phrases and sentences although her speech remained laboured and self-conscious. She did not feel comfortable using Hebrew.

On retesting, she scored 36½ on the SAS and 42 on the H.L.Q. with a score of 239 on the L.M.T.A. The latter test was given five days after the SAS and H.L.Q.

Case 14 (N.H.)

A male aged 47 of Polish origin who had been well educated and had been a production manager in a metal factory prior to his first C.V.A. at the age of 43. He had been in Israel for 22 years. His home language was Polish but he had also spoken Yiddish, Russian and German apart from Hebrew. He suffered a C.V.A. six months prior to testing but received no treatment.

On testing, he scored 48½ on the SAS and 44 on the H.L.Q. with 200 on the L.M.T.A. The SAS was given three days before the other two tests.

His main difficulties were in reading and writing. Therapy was initiated with pictures of objects used to stimulate naming orally and writing. The patient was given auditory stimulation to discriminate between the sounds heard, and to attempt to write them in the correct order. He was given practice in writing words from dictation where the initial

letters were different such as "mapa", "sapa" and when this was mastered he attempted words with different endings. He was encouraged to read short articles and write words from the articles which were difficult for him. The patient progressed well and was aware of his improvement.

On retesting he scored 43% on the SAS, 34 on the H.L.Q. and 158 on the L.M.T.A. The SAS was only given a week after the H.L.Q. and L.M.T.A.

Case 15 (Y.W.)

A male member of a communal settlement, married and aged 54. He had completed high school in Germany and one year post-school. In 1939, he had immigrated to Palestine. He had studied Hebrew in Germany for one year and had spoken, written and read Hebrew prior to illness. He was first seen two weeks after suffering a C.V.A.

On the SAS he scored 41% and 48 on the H.L.Q. On the L.M.T.A. he scored 147. The SAS was given two days before the H.L.Q. and the L.M.T.A. a day later.

Understanding was unimpaired but his oral encoding disability was severe and difficulties in graphic encoding were also marked. Because of his unimpaired auditory decoding, prognosis was considered favourable. The patient had been left-handed all his life and was now suffering from a right hemiplegia. There was a dysarthria present and several substitution and distortions in his speech.

Therapy was initiated with the improvement of his dysarthria and the stimulation of language expression as the main aims. The patient was

greatly helped by mirror work and by visual stimuli. Reading of the newspaper was started immediately. Early on in treatment, the patient became a grandfather for the first time and the excitement and happiness motivated him and helped stimulate his speech. Writing was practised with material from the newspapers read. He was able to write a letter to his daughter with many mistakes. He was continually aware of his difficulties and could explain them accurately, for example, his distortions in spelling. From the twelfth lesson, he began to feel a tingling sensation in his face and movement of the facial muscles improved. He reported feeling better when he speaks softly. At this stage therapy was concentrated on his writing difficulty and in particular on certain consonants (n, ch, m, sh). Dictation was given using these letters. The patient was asked to sound out the letters as he wrote the word and he was given a lot of auditory stimulation before attempting to write the words. It was found that when the patient was unable to write a word correctly, he had the same spelling mistakes in spelling the word orally [36]. He was encouraged to spell the words out aloud before writing them, and his wife would correct him when necessary.

On retesting, the patient scored 44 on the SAS, 21 on the H.L.Q. and 70 on the L.M.T.A. which was given four days before the other two tests.

Case 16 (Y.S.)

Case 16 was a bank clerk aged 56 of Iraqi origin who had been living in Israel for seventeen years. He had had two heart attacks during the past two years and had suffered a C.V.A. two weeks before being tested. He was left with a mild hemiplegia and aphasia.

On testing, he scored 55% on the SAS, 4% on the H.L.Q. and 22% on the L.M.T.A. This patient's auditory decoding was only mildly disturbed and encoding, both oral and graphic, were most impaired. The SAS was given first and the L.M.T.A. and H.L.Q. two days later.

The patient had a very co-operative family who were prepared to help him in all his rehabilitative activities. Therapy was aimed at improving his recognition of objects and pictures and naming these objects. At the same time, he was required to read and write the names. Pictures of objects were used to simulate vocabulary and later action pictures. Before writing words, he was required to sound out the letters. This proved to be helpful. Reading was initiated with the therapist reading aloud and gradually allowing the patient to take the lead [37 p.357]. The patient was able to describe briefly what had been read. After ten lessons, the patient reported having a dream during which he spoke fluently. On awaking, he apparently spoke fluently to his family and regressed after fifteen minutes. This made him believe that some miraculous recovery was possible and at this stage the writer explained to him what had caused the speech difficulty and that it would require patience and hard work to achieve improvement.

He was perseverating both in spoken language and writing and found it difficult to find his written mistakes. Symptoms which he described resembled those of stuttering, i.e. ability to speak well with some people and not with others, blocking completely at times and having repetitive blocks. He was told to relax and try to think out what he was going to say and attempt to say it again. This helped him. Because of his vocational needs as a bank clerk, time was devoted to improving impaired arithmetical ability at each lesson. As the patient found picture descriptions easier, he progressed to free speech. He was required to act out certain situations

with the therapist such as phoning to order a taxi, etc. Towards the end of the three months therapy period, the patient was taught how to use his own mistakes as cues [6]

On retesting, he was found to have a score of 10% on the SAS and 22 on the H.L.Q. with 79 on the L.M.T.A. The SAS was given three days before the other two tests.

Concluding Comments on Group III

The patients in this group all made relatively good progress. Four of the six patients felt confident enough to carry on with their daily lives without further treatment. Two male patients, Case No. 15 and Case No. 16 were able to return to their former employment although on a reduced scale. Both these patients had very good help from their families between therapy sessions and this undoubtedly aided in their good improvement both in language and emotional state.

Case No. 13 needed further treatment but it seemed obvious that therapy in German would be of more assistance to her. Both this patient and Case No. 11 were hampered in their recovery of Hebrew by interference from their home languages. Case No. 11 had been more conversant in Hebrew prior to illness than Case No. 13 and so regained more Hebrew than the latter.

GROUP IV

Case 17 (Z.Y.)

Case 17 was a woman of Russian origin who had been a teacher of backward children prior to illness. Her home language was Yiddish and her Hebrew had been good. She suffered a C.V.A. with resulting right hemiparesis two months before being tested. The patient had been left-handed prior to illness.

On testing, she scored 11% on the SAS. There was some doubt whether to treat the patient but her higher score of 31 on the H.L.Q. and her own feeling of disability decided the matter. She scored 78 on the L.M.T.A. The L.M.T.A. was given first, the H.L.Q. three days later and the SAS three days after that.

Her main difficulty was in graphic encoding and therapy was initiated to help her overcome her perseverations and distortions in writing. She was also helped in improving her ability to describe in sentences what she had read. For this purpose, simple paragraphs were used. She was asked to read the article aloud, then summarize what she had read and then write her summary. She progressed well and was soon reading her regular daily newspaper in the same way as the paragraphs described above. A slight dysarthria was also present which was treated by giving tongue and lip exercises. The patient only received two months treatment but was retested after the three months period.

Retest results showed a score of 9% on the SAS and 26 on the H.L.Q. with 68 on the L.M.T.A. The SAS was given five days after the other two tests. At the time of retesting, the patient complained of tiredness and

this apparently influenced her results. Her oral encoding impairment was better on retest than testing and is believed to have been influenced by the patient's fatigue.

Case 18 (C.C.)

Case 18 was a male accountant aged 40 who was of Iraqi origin and had been in Israel for eighteen years. His Hebrew had been good in all spheres. He suffered a C.V.A. two weeks before being tested.

His test score on the SAS was 11½ and 24 on the H.L.Q. On the L.M.T.A. he scored 125. The L.M.T.A. was given four days before the other two tests.

Although his disability was only slight, it disturbed the patient because of his professional needs. He was anxious to return to work and his reading and writing difficulties affected him. Therapy concentrated on improving these aspects. He began by writing words, then paragraphs which he had read from the newspaper. He was also given dictation. At all times, self-inspection and correction were stressed so that the patient was soon able to work on his own and correct his mistakes. He only received lessons for one month as he felt capable of continuing on his own.

On retesting, he scored 6½ on the SAS and 20 on the H.L.Q. showing no impairment in either language. He scored 68 on the L.M.T.A. The H.L.Q. was given two days before the L.M.T.A. and the SAS only five days later.

Case 19 (M.G.)

Case 19 was a male aged 57 who had been a carpenter prior to suffering

a C.V.A. and being left with a slight right hemiparesis, dysarthria and a mild aphasia twelve days before being tested. He was of Rumanian origin and had been in Israel for 34 years. He had spoken and written Hebrew. The L.M.T.A. was given first, and the SAS and H.L.Q. two days later.

Testing revealed a predominantly graphic encoding difficulty and a slight dysarthria. His scores were 15% on the SAS and 21 on the H.L.Q. with 88 on the L.M.T.A.

During a month's treatment, the patient was helped by practising words with certain difficult letters to overcome his dysarthria, and was aided in overcoming his writing difficulty by practising writing from dictation and then spontaneously. He improved sufficiently to reject the idea of having treatment after he had left the hospital.

On retesting, he scored 4% on the SAS, 20 on the H.L.Q. and 70 on the L.M.T.A. All three tests were given on the same day.

Case 20 (H.B.)

Case 20 was a male aged 62 of Austrian origin. He had been living in Israel for 34 years and was an estate agent with a primary school education. He had diabetes and had suffered a cerebral embolism two weeks before being tested.

His greatest disability was in verbal decoding and he also had a slight dysarthria and slow, drawled speech. The L.M.T.A. was given one day before the SAS and the H.L.Q. four days later. On the SAS he scored 29%, 21 on the H.L.Q. in Yiddish and 145 on the L.M.T.A.

Work was initiated on this latter problem with the patient being encouraged to articulate words clearly while reading and to increase speed of reading. He worked on reading paragraphs and repeating words not pronounced clearly. He was also asked to repeat the contents of the paragraph which proved to be difficult for him, as his memory span for written material was poor. Towards end of treatment, pictures were introduced as a stimulus for spontaneous speech. The patient was disturbed by his general condition and especially his inability to carry on a normal sex life as he had prior to illness. This preoccupation affected retest results as he kept digressing while being retested and the writer feels that his scores were thus affected.

He scored 30% on the SAS, 22 on the H.L.Q. with a score of 86 on the L.M.T.A. The L.M.T.A. and H.L.Q. were given on the same day and the SAS one day later.

Concluding Comments on Group IV

All the patients in this group were very mild and two of them responded very well to treatment. Case No. 20 did not seem to be highly motivated to improve his speech. He was already coping with business activities despite his dysarthria.

General Comments

In this chapter it was attempted to show that various types of therapeutic programmes were utilized depending upon the severity of the patient and the ultimate goals in therapy. Certain factors appear to have played

a significant role in the amount of recovery made. These are:

1) Age: All the younger patients made satisfactory progress. It is possible that they were also more motivated than the more elderly patients.

2) Etiology: The extent of brain damage and the patient's general health influenced his improvement. Where brain damage appeared to be more severe, the patient's improvement was slower and often minimal.

3) Emotional State: Patients who were not depressed and who were sufficiently aware of their difficulties, made the best progress.

4) Family Cooperation: This was of great importance. In Cases No. 7 and 10 this was the significant factor which helped the patients to make a good recovery.

5) Former Language Spoken: It appears to this writer that patients who had never mastered Hebrew although they had been living in the country for 15 years or more, were hampered in recovering the little Hebrew they had known, by interference from the Home Language. This was true mainly of those patients who were German or Rumanian speaking, and was not found to be true of patients from Arab speaking countries. It would be of interest to discover why particularly German speaking people find the acquisition of a language, such as Hebrew, very difficult.

Therapeutic Influence on Home Language

The hypothesis of this study that therapy in Hebrew would have a positive influence on the patient's home language appears to be proved correct. Where improvement was made in Hebrew, a similar improvement was found in the home language in the majority of patients. A detailed consideration of the test scores will be presented in the following chapter. In

brief it may be added that fifteen out of the twenty patients treated made improvement both in Hebrew and their home language. Cases No. 19 and 20 were very mild from the outset and showed little change in either language. Case No. 1 was very severe and made minimal improvement. Case No. 2 regressed after three months treatment due to his very severe condition. Case No. 3 showed slight regression in her home language and no improvement in Hebrew. There was no case in which improvement was shown in the home language without a comparable improvement in Hebrew, e.g. Case No. 9 scored 79% on the SAS test and 43% on the retest. On the H.L.Q. he scored 79 and 44; Case No. 16 scored 55% on the SAS and 10% on the retest. On the H.L.Q. he scored 46 and 22. The SAS retest score shows no aphasia, the H.L.Q. shows a very slight disability as a score of 20 is normal. Case No. 4 scored 91% on the SAS and 51% on the retest. He scored 84 on the H.L.Q. and 54 on the retest. In Appendix IV where detailed results are given of each patient it will be seen that results in Hebrew and the patients home language follow a similar pattern.

CHAPTER VIII

RESULTS AND DISCUSSION OF RESULTS

Research is carried out in order to test the acceptability of hypotheses which are derived from our theories of behaviour. After having decided on a hypothesis and having collected data, an objective decision must be reached as to whether the data can be confirmed or not. The objective procedure is based on the information obtained and on the risk we take that our hypothesis may be incorrect.

The purpose of the present study is to show the effect of speech and language therapy in Hebrew on the patient's home language. Thus the most important result is the comparison of the test and retest scores on the SAS and the test and retest scores on the H.L.Q. It was also of importance to the writer to test the validity of the SAS as used in Hebrew. For this purpose the L.M.T.A. and SAS scores on test and retest will be compared. Several statistical tests are available for use with a given research design and a test must be chosen "whose model most closely approximates the conditions of the research" and "whose measurement requirement is met by the measures used in the research" [42 p.6]. When the nature of the population to be sampled and the manner of sampling have been achieved, a statistical model is established. For the purpose of this study, nonparametric statistical tests were chosen for the following reasons as given by Siegel [42]:

- 1) The sample size is small.
- 2) The variables involved have not been measured on an interval scale.

- 3) A non-parametric test does not specify conditions about the parameters of the population from which the sample is taken

In order to compare raw scores on the L.M.T.A. and SAS, a means of calculating such scores on the former test had to be found. As the test stands it provides scores under each sub-test but no total scores. The writer suggested a means of calculating total scores and this was accepted by Wepman [61] as follows:

A patient is scored on a scale of 1-6 for each item on a sub-test. It was suggested that his score be multiplied by the number under which it appears, e.g. four tallies under number 6 would count as 24. This gives a quantitative value to the scores. On the advice of Wepman [61] the "Tell A Story" item was omitted as he believes that there is no comparative item in the SAS, and also the means of scoring differs from the other items on the L.M.T.A.

In research it is often necessary to know whether two sets of scores are related and so to what degree. Siegel [42 p.202] presented the Spearman Correlation Coefficient, i.e. as "... a measure of association which requires both variables be measured in at least an ordinal scale so that the objects or individuals under study may be ranked in two ordered series."

This method of correlation was considered the most suitable for comparing the results obtained in the present study. Details of Raw Scores and statistical procedures used will be found in Appendix IV.

It is necessary to rank the scores obtained by subjects on the two tests to be compared before the r_s can be worked out. Ranking is a method

of organizing scores into an ordinal scale which shows the relationship between the scores, i.e. some are higher than and others lower than any given score [42 p.24].

Where two subjects have achieved the same results, each of them is assigned the average of the ranks which would have been assigned had no ties occurred. The effect of ties on the r_s in this study is negligible as the proportion of ties is not large [42 p.206].

The results obtained in this study will be presented in the following order:

- 1) Correlation coefficient between SAS and L.M.T.A. tests.
- 2) Wilcoxon Matched Pairs signed-ranks test to show significance of improvement on SAS and H.L.Q. respectively.
- 3) Correlation coefficient between SAS and H.L.Q. tests.

1) A Comparison between Results on the L.M.T.A. and SAS Tests

Method: Results on the above two tests and retests were ranked taking Case No. 3 as 1. Cases Nos. 1 and 2 did not achieve results on the L.M.T.A. and thus were not used in this comparison. The Spearman Rank Correlation Coefficient r_s was used to establish the correlation between the results on the two tests and a formula taking into account ties in ranking was used as follows:

$$r_s = \frac{\sum x^2 + \sum y^2 - \sum d^2}{2\sqrt{\sum x^2 \sum y^2}}$$

where

$$\sum x^2 = \frac{N^3 - N}{12} - \sum T_x$$

and

$$T_y^2 = \frac{N^3 - N}{12} - \sum T_y$$

$$T_x = \frac{t^3 - t}{12}$$

The r_s on the SAS and L.M.T.A. test results was 0.93 with a level of significance of $P = 0.01$. On the retests the r_s obtained was 0.95. The level of significance here was $P = 0.01$.

Conclusion: As the level of significance between the SAS and L.M.T.A. is high, it can be concluded that the two tests measure the same disorder. The L.M.T.A. was proved valid as a test of aphasia in Hebrew by Bar-David [4], therefore it may be presumed that the SAS is also valid.

2) A Measure of Improvement on the SAS and H.L.Q. Respectively

The Wilcoxon matched pairs signed-ranks test is used when the researcher wants to show which member of a pair is "greater than" which i.e., the sign of the difference between any pair, and he can also rank the differences in order of absolute size [42 p.75]. In this study the test was used to show whether patients made a significant improvement on the SAS and the H.L.Q. respectively. On the SAS the T obtained between test and retest is 8.

This enables us to reject the null hypothesis at a level of significance of $P = 0.01$. On the H.L.Q. the T obtained is 6.5.

The Null hypothesis is rejected at a level of significance of 0.01

Thus there is a significant difference between test and retest on both tests.

3) A Comparison of Results Obtained on the SAS Test and Retest and the H.L.Q. Test and Retest

Method: Results on the above tests were ranked including cases No. 1 and 2. The index of rate of improvement is the difference between the ranking on test and retests. This difference (d) was then ranked. The reranking on the SAS and H.L.Q. was then compared and r_s computed.

The Spearman Rank Coefficient Correlation between the improvement made on the SAS and the improvement made on the H.L.Q. is $r_s = .72$. The level of significance is $P = 0.01$ $0.72 > 0.53$.

Conclusion: It appears from the above result that the correlation of improvement between the results obtained on the SAS and H.L.Q. is significant. It may thus be stated that there is a positive relationship between the improvement made by a group of 20 patients in Hebrew and in their own home language after three months speech and language therapy.

DISCUSSION OF RESULTS

(1) Comment on Tests Used

It is the opinion of this writer that no test replaces careful observation. Both the SAS and L.M.T.A. proved to be valid tests of aphasia and gave leads as to the type of therapy program to be planned and the areas

most requiring assistance. It is necessary to examine the patient oneself or to be present at the time of testing in order to observe how the patient reacts to the test material and testing situation.

It must be restated that the H.L.Q. was not considered to be a "test" but a questionnaire designed to provide some information about the patients' home language ability at the time of testing. Nevertheless the Spearman Rank Correlation Coefficient between the H.L.Q. and SAS was $r_s = 0.88$ ($P < 0.01$) which is a significant correlation.

The H.L.Q. proved to be a difficult questionnaire to use because of the necessity to explain questions in Hebrew and have the questioner translate them into his home language. It was never certain how accurately the question had been translated and to what extent the patient was being helped.

(2) Time Lapse Between Tests

In planning the procedure for this project, it was decided to administer the three tests to be used on consecutive days and where feasible, on the same day. For practical reasons this was very difficult. The patients' families were not always available and the H.L.Q. had to be given when someone from the family was present who knew the home language well enough to ask the questions. This writer does not consider that the time lapse between tests was of vital importance for the validity of this study. No therapy was started until all the tests had been given. The high correlation between test results on the SAS and L.M.T.A. appears to indicate that there was no significant change in the patient's condition at the time of testing on each test.

(3) Test Results

This study and the A.R.P. present the first attempt to use either the SAS or L.M.T.A. in the Hebrew language. This writer considers some of the results to have been affected by the examiners' inexperience in the use of these tests. Case No. 13 was the first patient to be tested. Her results on the three tests vary. She is ranked as 10 on the SAS and 4 on the L.M.T.A. Other subjective factors which were apparent to the writer appear to have affected test and retest results, viz. fatigue, nervousness and relationship with the tester. Case No. 17 was very tired when having the SAS and H.L.Q. retest and this was thought to have affected her results. Case No. 15 was nervous while taking the L.M.T.A. retest. He was not well acquainted with the examiner as with the examiner on the SAS, and expressed his nervousness and anxiety to prove himself. Cases No. 1 and 2 were not able to achieve scores on the L.M.T.A. as they could not even pass the screening test. On the basis of this failure they should not have been taken for therapy. But as has been stated previously in Chapter VII, the writer felt that an attempt should be made to help them. Their poor results both on the SAS and H.L.Q. shows the ineffectiveness of speech and language therapy with such patients.

(4) Method of Acquiring Hebrew

The patients in this study can be divided into three groups as regards their means of learning Hebrew initially:

- a) As a language of prayer (6 patients).
- b) As a spoken language only (7 patients).
- c) As a spoken, read and written language (patients).

There is no difference in results between the patients in the three groups. Therefore it may be concluded that the method of learning Hebrew initially was not an influencing factor on the patients progress.

(5) Spontaneous Recovery

This was considered as a possibility with each case. In a number of cases it seems to have influenced the patients progress. Case No. 7 showed very rapid and marked improvement which the writer felt was due to spontaneous recovery. Osgood and Miron [31 p.33] state that the recovery from oedema in the early stages after trauma or surgery influences the patient's spontaneous recovery. This appears to be true of Case No. 7. Both Cases No. 18 and 19 were very mild at the outset and did not receive the full three months therapy because they felt able to cope on their own. Spontaneous recovery may have played a role in their recovery.

(6) Regression

There was very little regression noticed after three months therapy. In patients where no progress was made in Hebrew the same applied to their home language. Where a drop in test results was evident, such as in Case 20, it was only a slight regression and in this case was probably influenced by the patient's anxious state at the time of retesting. Case No. 3 made no significant progress.

(7) Family Influence on Therapy

It was found that when the patient's family were cooperative and willing to help in the therapy programme, progress was influenced positively. This was true in Cases 15 and 16.

In Case No. 9 (E.K.) where the relationship of the patient to his wife was aggressive prior to illness, she could not be of any assistance in the therapy programme. The same applies to Case No. 7 (H.H.) but in this instance spontaneous recovery was evident and the family relationship did not interfere with improvement.

(8) Psychological Factors

Eisenson is of the belief that aphasics who were neurotic prior to illness will have more difficulties in adapting to the situation than those who were better adjusted [31 p.51]. In this study psychological factors played a role both in the general recovery of language and possibly in the ease with which one language may have been regained in preference to others. This will be commented on in more detail in the next chapter. In the case of patients 13 (R.B.) and 11 (M.O.) affective factors played an influence on their recovery of Hebrew. Both of them had managed well in their home language prior to illness and had never had the incentive to speak Hebrew. On the other hand, patients such as 16 (Y.S.) and 18 (C.C.) were motivated to return to professions in which spoken and written knowledge of Hebrew would be essential.

General Comments

This writer considers it of importance that no patient made significant

improvement in Hebrew without a similar improvement in his home language. Conversely, no patient regained his home language during the three months of therapy without a comparative gain in Hebrew the language of treatment. This fact seems to prove that the improvement in the home language could not have been a result of spontaneous recovery alone as a similar improvement was made in Hebrew. Therefore, therapy given in Hebrew must have been the influencing factor on the recovery of the home language.

CHAPTER IX

CONCLUSION

A sample of twenty adult aphasic patients living in Israel and having immigrated in adulthood was studied with the following hypothesis in view:

That therapy in Hebrew which was not the patients home language, would have a positive effect on the recovery of the home language.

After having been tested both in Hebrew and their home languages, and having received therapy on an average of three times a week for three months it was concluded that there is a positive influence of therapy in Hebrew on the patient's home language. It was also shown statistically that a significant correlation exists between the results obtained on the Sklar Aphasia Scale in Hebrew and on a Home Language Questionnaire in the patient's own home language. No patient made a significant improvement in his home language without a corresponding improvement in Hebrew, the language used in therapy. Conversely no patient improved in Hebrew without a similar improvement in his home language. It may therefore be assumed that therapy in Hebrew had a positive effect on the Home Language.

An attempt will be made to draw on the theories of aphasia and of bilingualism which were discussed in Part I of this dissertation, in order to find an explanation which will justify the above conclusions.

No-where in the literature has this writer been able to find proven explanations of what takes place in the brain during the recovery of language after aphasia. Neither have investigators reached final conclusions

as to a psychological or neurological explanation of bilingualism in terms of where different languages are located in the brain [53 p.72]. Nevertheless, this writer does not believe that separate centres exist for each language learnt by an individual. Penfield [32 p.253] states that "French is not subserved by one area of the brain and English and Chinese by others." He claims that in thirty years experience in Montreal he has not come across cases of patients who have lost one language and retained another after brain injury. From this it may be assumed that when an area of the cortex is damaged or injured and a language function disturbed, the same function in other languages is disrupted as well. Thus if through therapy the language centres can be stimulated, all languages stored in those areas should benefit.

The method of learning a secondary language may have an effect on how it is restored after aphasia. The patients treated in this study were all what may be termed "coordinate bilingual" according to the definition of Osgood and Miron [31 p.35]. Each language was learnt under different circumstances and has different affective associations for the bilingual. This writer believes that the relearning of Hebrew was important for eighteen out of the twenty patients treated and motivated them in therapy. Only two patients were able to run their daily lives without the use of Hebrew.

A theory which may explain the carryover of improvement into the home language, is propounded by Osgood and Miron [31 p.136]. They state that "... development of linguistic discriminations depends upon psychophysiological factors rather than the structure of any code per se." This has not yet been proved correct by them, but they believe that in order to do so it would have to be shown that "... grammatical and phonemic contrasts regained in one language" are transferred to other languages [31 p.136].

It appears to this writer that such a transferral may have taken place amongst the majority of patients treated in this study.

From a physiological view point it is hypothesized that therapy, re-activates certain impaired areas of the brain or stimulates other areas to take over disrupted language functions. In order to achieve this restoration of language, it is believed that a process of auditory and visual stimulation must be initiated, as was done with the patients in this study. Schuell et al. [37 p.338] have stated that "... repeated sensory stimulation is essential for organization, storage and retrieval of patterns in the brain and it would be strange if language patterns operated according to some other principle."

When the patient's main difficulty lies in an impairment of auditory perception, Luria [23 p.164] describes a process of retraining which illustrates the writer's belief that retraining of auditory perception need not be confined to any particular language. The patient's improved ability to distinguish between and articulate different phonemes must have an effect on other languages in which these sounds feature. In the case quoted by Luria, the difficulty after trauma was marked by a disturbance of 'phonematic hearing'. He could not repeat words and could not distinguish between phonemes, e.g. he repeated 'paba' as 'baba'. The initial treatment consisted in stimulation to enable him to distinguish between various sounds in words. Gradually the patient began to retain speech sounds and then to understand words. It is believed that patients in the present study who were trained to hear the sound /ma/ and distinguish it from /na/ were being aided in using these sounds in their home language and other languages spoken formerly.

During therapy, the patient usually begins naming objects other than those he has been trained to name. "It is as if, having discovered the key to a locked door, it becomes progressively easier to secure materials that are already stored there" [31 p.33]. This seems to be applicable also to the recovery of words in languages other than that used in therapy.

The treatment programme was based on the individual needs of each patient and the family involved in helping the patient between lessons wherever possible. It was evident in the patients improvement when the family was being cooperative. Cases Nos. 15 and 16 are examples of a positive influence of the family, whereas the lack of improvement in Case No. 3 was considered due partly to her solitary existence. Cases Nos. 4 and 9 could have made further improvement, in this writer's opinion, had their family relationships been more favourable.

The writer believes in the benefit to the patient of simultaneous writing and saying of words. It may be true that the act of writing with the left hand does not in itself help in regaining speech (Schuell [36 p.132]), but it is thought that the combined activities facilitate the recall and uttering of the word. In this respect, illiteracy was considered a disadvantage for the patient undergoing treatment. The ability of patients to read the daily newspaper acted as a reinforcing factor in whatever language the paper was read.

Group therapy proved to be of little value in the present study. There were only four patients who were hospitalized at the same time and for whom group therapy was of assistance.

It was of interest to this writer to note the interference of the patient's former languages on his recovery of Hebrew. Of special signifi-

cance was the fact that the amount of time since immigration was not as important as the patients' age and home language. The majority of younger patients and those coming from countries in Africa or the Middle East were able to relearn Hebrew without inserting words of another language. Those patients from Europe, and especially from Germany and Rumania, continually introduced words from their home language into their Hebrew vocabulary. There are, of course, emotional factors which may have played a role in this process. The younger patients with families and children were more highly motivated to speak in Hebrew.

LIMITATIONS OF THE PRESENT STUDY

One of the unforeseen problems which was encountered in this study, was the difficulty in finding suitable patients. The number of patients who did not want to complete treatment, or could not be accepted for treatment was relatively high. Only 20 patients received treatment out of 35 tested.

In planning this study it was originally considered having a control group who would not receive therapy during the three months between testing and retesting. It was decided to wait until the project was underway and then to reconsider this proposal. Once the project was started, and the difficulty in finding suitable cases was experienced, it was proved to be impractical to consider a control group. It is believed that the lack of a control group made it difficult to ascertain the amount of spontaneous recovery which may have played a role in the patients' recovery of speech and language.

There were variables during the period of treatment which were beyond the control of the therapist. The amount of home language which the patient heard and spoke with his family and friends, could not be estimated. Osgood and Miron [31 p.33] point out that in considering the amount of improvement an aphasic has made, the practice and experience which he gains in every day living between therapy sessions must be taken into account.

A further limitation lay in the lack of suitable test material in all languages other than Hebrew. The H.L.Q. is not considered to be an adequate test and yet for practical purposes the compilation of tests in the various languages was impossible. The fact that the family had to be relied upon to ask the questions on the H.L.Q. and to convey the correct interpretation of the answers to the therapist was a distinct drawback.

This writer believes that more intensive therapy, e.g. once a day instead of three times a week is essential for severe patients. Several of the patients in this study may have made better progress had they received daily treatment.

Mention must be made of the physical conditions under which the patients were tested and treated. Every attempt was made to obtain the most suitable conditions for this purpose. But the patients were not seen in a speech clinic but in various hospitals and in their own homes. The conditions were not always ideal and in hospital it was often difficult to eliminate noise.

APPLICATION

The results of this study may be applied in the following ways:

- 1) The Sklar Aphasia Scale was proved to be a reliable, easily adaptable

test. It is believed that this will be true in languages other than Hebrew.

2) The attempt to use a tape recorder to provide stimulation at home for Case No. 4 could be applied to other aphasic patients or patients with different speech defects.

3) The results of this study indicate that an adult aphasic may be taught words in a foreign language which he did not know prior to illness. This may be applied to the teaching of new languages to aphasics.

SUGGESTED RESEARCH

1) It was of interest to this writer to note that some home languages interfered with the relearning of Hebrew. It is known in Israel that certain communities find the learning of Hebrew more difficult than do others. It would thus be of importance to investigate which languages in a bilingual or polyglot aphasic patient tend to interfere with his relearning of the language of the country in which he lives.

2) It is suggested that languages which are linguistically related such as Hebrew to Yiddish, may aid the bilingual aphasic in language re-education, whereas languages unrelated such as Hungarian and Hebrew may act as an interference in therapy. This hypothesis could be investigated.

3) A similar project, to the one reported here, in a country such as South Africa with English and Afrikaans speaking patients, would provide interesting results for comparison with those obtained in this study.

4) A group of compound bilingual aphasics, who have learnt their two languages as "translation equivalents" [31 p.135], should be studied to

compare their progress to that made in the present study.

5) It may be of interest to determine whether or not a group of aphasics who were born in Israel and spoke Hebrew as their home language would have made the same progress as the patients in the present study.

6) A further study similar to the present one but including a control group who do not receive therapy may be possible in other parts of Israel.

In conclusion, this writer believes that the present study may provide information, help and encouragement for those therapists in all parts of the world who have felt doubtful about treating adult aphasic patients whose home language is not that of the country in which they live.

APPENDIX I

SKLAR APHASIC SCALE

by Maurice Sklar, Ph.D.

שם: _____ גיל: _____ סיווג: _____ חאריק: _____
 כתובת: _____ מס' טלפון: _____ מקצוע: _____
 נולד בארץ: _____ חאריק עליה: _____ חינוך: _____
 הסב המטופל: _____ ילדים: _____
 אבחנה: _____

חומת על ידי: _____ חאריק החלחלה החלחה: _____

המנהגות אפיונוליות

Confused _____ Disoriented _____ Paranoic _____ Delusional _____
 Depressed _____ Euphoric _____ Lethargic _____ Labile _____
 Anxious _____ Uncooperative _____ Other _____ Other _____

דברים

Jargon _____ Automations _____ Omissions _____ Perseverations _____
 Dysarthia _____ Oral Apraxia _____ Substitutions _____ Distortions _____
 Retardation _____ Other _____ Other _____ Other _____

THE SAS IMPAIRMENT SCORES ANALYSIS PROFILE

Sub-Test	Sub-Test Impairment	Item Score 0 1 2	None	Mild	Moderate	Severe	Total Global
I-A-D	x 2 =		0 10	11 30	31 60	61 90	91 100
II-V-D	x 2 =		0 10	11 30	31 60	61 90	91 100
III-O-E	x 2 =		0 10	11 30	31 60	61 90	91 100
IV-G-E	x 2 =		0 10	11 30	31 60	61 90	91 100
TOTAL IMPAIRMENT SCORE Equals							
Impairment Scores of							
I + II + III + IV divided by 4 =			0 10	11 30	31 60	61 90	91 100
Prognosis: (circle one)			Favorable		Uncertain		Unfavorable

Permission to translate the Sklar Aphasia Scale into Hebrew was granted by Dr. Maurice Sklar and Western Psychological Service, California.

IV. GRAPHIC DECODING (G - E)

2 1 0

2 1 0

2 1 0

2 1 0

2 1 0

IV - G - E Impairment Score Equals

IV. (1) שם

(2) כתובת

(3) עיר

(4) שם

(5) תאריך

Graphic copy

(6) שם

(7) כתובת

(8) מפתח

(9) זרוע

(10) שלום

כתב את השם אחת כל המונה

(11) מפתח

(12) מסך

(13) מספר

(14) מברשת סינטיים

(15) מספרים

ה כ ת ב ה

(16) אשה

(17) אני רעב

(18) פני רובח לשמור פים

(19) פה השעה

(20) כל יום אני פרגיש יותר טוב

ח פ ר נ ה

כתב 5 טעמים על המונה

(21)

(22)

(23)

(24)

(25)

III. ORAL ENCODING (O - E) Auditory-Oral

ש פ ו ת

איך קוראים לה?

III. (1) מפתח

(2) כדור

(3) יגין

(4) טעמריים

(5) מברשת סינטיים

אגיד אחרי

(6) עין

(7) שלום

(8) תן לי פים

(9) המונח יותר פדי מחוקות

(10) השוענים תן לבנות, מהבנות ואדומות

דבור יום יומי

(11) הגד לי את השם שלך

(12) הכתובת שלך

(13) פתי נולדת

(14) איפה נולדת

(15) כמה זמן אתה .

פ ש פ ש פ ש (כרטיס II/א)

המסלל במחנה והגד פה אתה רומה

(16)

(17)

(18)

(19)

(20)

כ ו פ ש פ ש VI

שם את המסור בקול רם וספר לי את

כל פה שמות זוכר.

(21)

(22)

(23)

(24)

(25)

III - O - E Impairment Score Equals

VISUAL DECODING (V - D)

(שיג את הכרטיס I על יד החולה וכתב)

אם אין תשובה מסביר "בנה עוד 2 1 0"
אחד בנותו"
II. (1) ר

2	1	0

- (2) שם
- (3) ילד
- (4) שלוש
- (5) אל

שים כרטיס II ו III על יד החולה וכתב. אם אין תשובה, מסביר

2	1	0

- (6) גיש
- (7) כלב
- (8) עץ
- (9) אה
- (10) מרובה

שים את כרטיס III על יד החולה

2	1	0

- (11) איש
- (12) שעה
- (13) טוב
- (14) עשוק
- (15) לבן

כרטיס IV

2	1	0

- (16) $5 + 4$
- (17) $10 - 6$
- (18) $26 \text{ ל"י} - 1.00 \text{ ל"י}$
- (19) 9×8
- (20) $36 : 4$

ק ר י א ה כרטיס V/א

2	1	0

- (21) א
- (22) ב
- (23) ג
- (24) ד
- (25) ה

II - V - D Impairment Score Equals

AUDITORY DECODING (A - D)

Auditory-Motor

האם יש לך בעיות בהפעלה חזרתית של ההמ?

2	1	0

- I. (1) פתח את הפה
- (2) נא לאנשיך את הלשון
- (3) נא לחזיז את הלשון פניו לצד
- (4) שים את הלשון מאחורי השיניים
- (5) גע כאוונן היפנית ביד השמאלית

ה ח פ צ א ו ה

האם אתה מבין שאלות ששואל?

- (א) תשובה לא נכונה ל- 10,8,6
- ונכונה ל- 9,7

2	1	0

- (6) האם יש לך
- (7) האם אתה גר ב
- (8) האם עכשיו חודש
- (9) האם היום יום
- (10) האם עכשיו לילה?

ס ג י ב ה

האם מכיר את שמות של הדברים סביבך?

2	1	0

- (11) הרמה לי את החלון
- (12) אישה הפגורה
- (13) אישה יש רהיטים
- (14) הרמה לי את הכניסה לאתר
- (15) הרמה לי את היציאה

זהו דברים

2	1	0

- האם כל הדברים האלה
- (16) באיזה כלי אתה מובל
- (17) בנה אתה פסנתר
- (18) לפי מה אתה יודע את השעה
- (19) בנה אתה חומה את הפנקול
- (20) בנה אתה פנק את השיניים

א ו ר ק ה ז כ ר ו ק

2	1	0

- האם רואה את כל הדברים האלה
- (21) הרמה לי את העפרון החשוב
- (22) הרמה לי את הפכית והמסור
- (23) הרמה לי את המספריים, הניר, הכפתור
- (24) הרמה לי את המכין, הכדור, השם, החפץ
- (25) הרמה לי את המספר, המספר, הכתוב

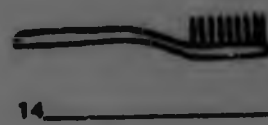
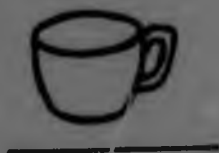
כ ת ב

- ד. (1) חשם שלך _____
 (2) הכחוכה _____
 (3) העיר _____
 (4) ארץ _____
 (5) האריך של חיום _____

ה ע ת ק (פרוגמה)

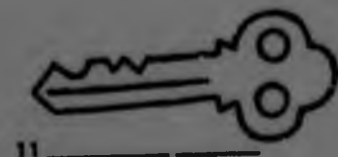
- (6) ח מ _____
 (7) כחוכה _____
 (8) _____
 (9) _____
 (10) _____

כתב שם תצויר



12 _____

14 _____



11 _____

13 _____

15 _____

ה כ ת ב ה

- (16) _____
 (17) _____
 (18) _____
 (19) _____
 (20) _____

APPENDIX II

HOME LANGUAGE QUESTIONNAIRE

The questions are analysed according to whether they test the following:

- Automatic, everyday activities - E
- Auditory decoding - A
- Auditory decoding Motor - A.M.
- Visual decoding - V
- Oral encoding - O
- Graphic encoding - G
- Arithmetic ability - A.R.

Question	Score	1	2	3	4	5	Analysis
		Yes	Nearly Always	Some-times	Seldom	No	
1. Can the patient tell you his name and address?							A/O
2. Does he recognise the names of family and friends?							A
3. Can he say their names?							A/O
4. Can he count to 20 ?							E
5. Can he name furniture in the room, e.g. table?							A/O
6. Can he read the newspaper and understand what he reads?							V
7. Can he read his name if its written for him?							V
8. Can he read aloud?							V-O
9. Can he count money?							AR/E
10. Does he understand what he is asked?							A
11. Does he understand what is read to him?							A
12. Can he ask questions?							O
13. Does he recognise colours?							V/E
14. Can he tell the time?							V/E
15. Can he do what he is asked, e.g. open your mouth, close your eyes?							AM
16. Can he copy his name and simple words?							V
17. Can he write simple words from dictation?							A/G
18. Can he point to objects in the room?							AM
19. Can he find the words to express himself?							O
20. Does he understand when he is told news?							A

APPENDIX III

PAMPHLET PREPARED FOR THE FAMILY OF THE APHASIC PATIENT*

TO YOU

THE FAMILY

OF THE APHASIC PATIENT.

In the last few days or weeks, you have known that someone close to you is suffering from an illness which makes it difficult for him to communicate with you. You may also have been told that the cause of this difficulty is an injury to the brain. He doesn't remember names and he may pick up an object such as a pen and not know what to do with it. At times you tell him some simple news and he doesn't understand. He may ask for his glasses and try to read the paper. When the letters don't make sense to him he complains that he needs new glasses. This is often not the cause of the trouble. The truth is that he may see as well as before but the words and the letters are meaningless to him. He may be one of the patients whose speech has been lost completely and he tries to communicate with you by using words which sound like nonsense. Or he may be one of the less severe cases who can express himself but suddenly forgets the name of a simple object. All these and many more are symptoms of a disorder known as "Aphasia". What does aphasia really mean? It means a loss of language - a loss of the ability to communicate. The severity of the disorder varies from patient to patient and in

*This pamphlet was translated into Hebrew by T. Gabrieli, into French by E. Landani and into German by H. Rosenberg, all of Haifa, Israel.

the same patient at different times. The difficulties are not only in speaking. A patient may not be able to read or write, to do arithmetic or to understand spoken language. Seldom does a patient have only one of these defects. Usually he has a combination of two or more. Now that the patient has started speech lessons there are many things you can do to help him.

1) Remember that the patient is an adult who is having difficulties. He should not be treated as a child.

2) His most urgent need is to communicate. Encourage him to do so in whatever way he is able. He may be able to point to things that he wants or to write words. Encourage him to speak when he makes an effort but don't demand too much from him. He may become easily tired and despondent.

3) It sometimes helps the patient who is searching for the right word if you give him a hint or remind him of the first letter of the word. This is often enough to help him to say the word. But allow him to try to find the word alone before you help him.

4) Don't let him feel that you are worried or upset by his speech difficulty. Don't ask him to speak more clearly or to "tell them" when friends come to visit. This only embarrasses him and won't help him to speak.

5) Sometimes you may find it impossible to understand what the patient is trying to tell you. You may try to help him by suggesting that he forgets about it for the time being and you'll discuss it again later.

6) Speak to him clearly and simply. It may be difficult for him to understand long sentences and explanations, so it is better to explain things briefly.

7) It helps to talk to him about everyday things that he can see in his surroundings, e.g. his food, the furniture in the room, his clothes. You

may ask him to name these things for you and to try to ask for the things he wants.

8) Encourage him to use everyday phrases such as "Shalom", "How are you". This will help him to be more sociable.

9) Ask him simple questions which require simple answers such as "Yes" or "No" instead of asking him questions such as "What happened today?"

10) If you feel he understands you should tell him the news from home and let him feel that he is still an important part of the family and you value his opinion when he is able to give it.

11) Some patients become easily upset. When you find that he begins to laugh or cry easily and finds it difficult to stop himself, change the subject and start talking about something else.

12) He should not have more visitors than he can cope with. You should explain to the visitors before they see him that he has difficulty in understanding and in speaking. It helps to tell them some of the things you have learnt about aphasia before they see the patient (not to ask complicated questions, not to show their upset or worry about his lack of speech, etc.).

13) If a patient was difficult before the illness he may be even more so now. Others who were easy-going people may become difficult, impatient and frustrated as a result of their illness. You must show patience and understanding.

14) Don't make the patient feel too optimistic by statements such as "Don't worry you will soon be back at work". It is better to say to him "I understand how hard it is for you, but you are making good progress").

15) You will probably ask yourself how long will it take for the patient to get better. This is a very difficult question to answer. It is generally accepted that the patient makes his maximum recovery in the first six or nine months after the onset of illness. Some patients may return to their

former employment, and others may not recover sufficiently to return to work. The main thing is to encourage the patient to be as independent as possible in every aspect of his life. Recovery is a slow process which is helped by encouraging the patient to do as much as he can for himself. Don't speak for the patient or answer questions for him when he is able to do so for himself, even if his speech is not clear.

When the patient returns home remember the following:

- 1) He must be as independent as is physically possible.
- 2) Don't keep remembering or talking about how he used to be before. Accept him as he is now and help him to make the most of the abilities he has.
- 3) Try to have a sense of humour and encourage him to see the lighter side of life too without laughing at him.
- 4) Try to look after yourself and see that you have time out of the house away from the patient at least once a week.
- 5) Try to keep the patient busy around the house with some type of occupation he may have learnt in hospital.
- 6) He must be helped to resume his former role in the family to as large an extent as is possible.

Recovery is a slow process. It is helped by encouraging the patient to do as much as he can for himself. The important thing is to forget his handicap and make full use of the abilities that are left to him.

APPENDIX IV

STATISTICS

A. RAW SCORES

Case	SAS		SAS		L.M.T.A.		H.L.Q.	
	Excluding cases 1 & 2		3	4	5	6	7	8
	test	retest						
1.	372	374	372	374	412	405	80	85
2.	326	304	326	204	341	242	84	54
3.	360	256	360	256	420	263	53	27
4.	304	296	304	296	289	261	64	59
5.	294	88	294	88	305	120	68	24
6.	318	178	318	178	420	229	69	41
7.	316	172	316	172	298	177	76	44
8.	242	148	242	148	256	160	63	39
9.	158	90	158	90	173	96	33	21
10.	174	142	174	142	195	155	55	29
11.	208	146	208	146	365	239	55	42
12.	192	172	192	172	200	158	44	34
13.	124	26	124	26	147	70	48	21
14.	224	42	224	42	221	79	46	22
15.	44	36	44	36	78	68	31	26
16.	44	24	44	24	125	67	24	20
17.	58	16	58	16	88	76	21	20
18.	116	119	116	119	145	86	22	21
19.			362	318			79	74
20.			364	376			80	78

Please note: Cases No. 1 and 2 as discussed in Chapter VII, are presented as No. 19 and 20 as they have no L.M.T.A. results. In calculating the r_s between the SAS and H.L.Q. they again appear as No. 1 and 2.

B. RANK SCORES

Case	SAS		SAS		L.M.T.A.		H.L.Q.	
	1 test	2 retest	3 test	4 retest	5 test	6 retest	7 test	8 retest
1.	1	1	3	3	3	1	4.5	3
2.	3	4	2	1	5	4	2.5	2
3.	2	3	1	2	1.5	2	2.5	1
4.	6	2	5	6	8	3	1	5
5.	7	13	4	5	6	11	12	12
6.	4	5	8	4	1.5	6	8	4
7.	5	6.5	9	1.5	7	7	7	14
8.	8	8	6	7	9	8	6	8
9.	13	12	7	8.5	13	12	4.5	6
10.	12	10	10	10	12	10	9	9
11.	10	9	15	14	4	5	16	17
12.	11	6.5	11	12	11	9	10.5	11
13.	14	16		11	14	16	10.5	7
14.	9	14		8.5	10	14	15	10
15.	17.5	15	16	18	18	17	13	17
16.	17.5	17	11	16	16	18	14	15
17.	16	16	19.5	17	17	15	17	13
18.	15	11	10.5	19	15	13	18	19.5
19.			18	20			20	19.5
20.			17	13			19	17

C. SPEARMAN RANK CORRELATION COEFFICIENT: r_s

$$r_s = \frac{\sum x^2 + \sum y^2 - \sum d^2}{2\sqrt{\sum x^2 \sum y^2}}$$

where

$$\sum x^2 = \frac{N^3 - N}{12} - \sum T_x$$

and

$$\sum y^2 = \frac{N^3 - N}{12}$$

and

$$T_x = \frac{t^2 - t}{12}$$

This formula takes into consideration ties in ranking.

D. r_s BETWEEN SAS TEST AND L.M.T.A. TEST
i.e., (1) and (5) of Raw Scores.

Case	d_1	d_1^2
1	-2	4
2	-2	4
3	0.5	0.25
4	-2	4
5	1	1
6	2.5	6.25
7	-2	4
8	-1	1
9	0	0
10	0	0
11	6	36
12	0	0
13	0	0
14	-1	1
15	-0.5	0.25
16	1.5	2.25
17	-1	1
18	0	0

$$\sum d_1^2 = 65.00$$

$$\sum x^2 = \frac{(18)^2 - 18}{12} - \frac{2^2 - 2}{12} = \frac{5812}{12} - \frac{6}{12} = 484$$

$$\sum y^2 = \frac{(18)^2 - 18}{12} - \frac{2^2 - 2}{12} = 484$$

$$r_s = \frac{484 + 484 - 65}{\sqrt{484 \cdot 484}} = \frac{903}{2 \cdot 484} = \frac{903}{968} = 0.93 \quad (P < 0.01)$$

Therefore there is a high correlation between the two tests.

E. r_s BETWEEN SAS RETEST AND L.H.T.A. RETEST
i.e., between (2) and (6) of the Raw Scores.

Case	d_i	d_i^2
1	0	0
2	0	0
3	1	1
4	-1	1
5	2	4
6	-1	1
7	-0.5	0.25
8	0	0
9	0	0
10	0	0
11	4	16
12	-2.5	6.25
13	0	0
14	0	0
15	-2	4
16	-1	1
17	3	9
18	-2	4

$$\sum d^2 = 47.50$$

$$\sum x^2 = \frac{18^2 - 18}{12} - \frac{2^2 - 2}{12} = 484$$

$$\sum y^2 = \frac{18^2 - 18}{12} - 0 = 484.5$$

$$r_s = \frac{484 + 484.5 - 47.5}{2\sqrt{484 \cdot 484.5}} = \frac{921}{968} = 0.952 \quad (P < 0.01)$$

Therefore there is a high correlation between the two tests.

F. r_s BETWEEN SAS TEST AND H.L.O. TEST
i.e. (3) and (7) of Raw Scores

Case	d_1	d_1^2
1	-1.5	2.25
2	-0.5	0.25
3	-1.5	2.25
4	4	16
5	-1	1
6	0	0
7	2	4
8	0	0
9	2.5	6.25
10	1	1
11	-1	1
12	3.5	12.25
13	1.5	2.25
14	-2	4
15	3	9
16	-3	9
17	2.5	6.25
18	1.5	2.25
19	-2	4
20	-2	4

$$\sum d_1^2 = 150.00$$

$$\sum x^2 = \frac{(20)^2 - 20}{12} - \frac{2^2 - 2}{12} = 665 - 0.5 = 664.5$$

$$\begin{aligned} \sum y^2 &= \frac{(20)^2 - 20}{12} - \left(\frac{(2)^2 - 2}{12} + \frac{(2)^2 - 2}{12} + \frac{(2)^2 - 2}{12} \right) \\ &= 665 - 1.5 = 663.5 \end{aligned}$$

$$r_s = \frac{664.5 + 663.5 - 150}{2\sqrt{664.5 \times 663.5}} = \frac{1178}{1328} = 0.88 \quad (P < 0.01)$$

Therefore there is a high correlation between the two tests.

F. r_s BETWEEN SAS TEST AND H.L.O. TEST
i.e. (3) and (7) of Raw Scores

Case	x_i	x_i^2
1	-1.5	2.25
2	-0.5	0.25
3	-1.5	2.25
4	4	16
5	-8	64
6	0	0
7	2	4
8	0	0
9	2.5	6.25
10	1	1
11	-1	1
12	3.5	12.25
13	1.5	2.25
14	-2	4
15	3	9
16	-3	9
17	2.5	6.25
18	1.5	2.25
19	-2	4
20	-2	4

$$\sum x_i^2 = 150.00$$

$$\sum x^2 = \frac{(20)^3 - 20}{12} - \frac{2^3 - 2}{12} = 665 - 0.5 = 664.5$$

$$\begin{aligned} \sum y^2 &= \frac{(20)^3 - 20}{12} - \left(\frac{(2)^3 - 2}{12} + \frac{(2)^3 - 2}{12} + \frac{(2)^3 - 2}{12} \right) \\ &= 665 - 1.5 = 663.5 \end{aligned}$$

$$r_s = \frac{664.5 + 663.5 - 150}{2\sqrt{664.5 \cdot 663.5}} = \frac{1178}{1328} = 0.88 \quad (P < 0.01)$$

Therefore there is a high correlation between the two tests.

G. COMPARISON BETWEEN IMPROVEMENT MADE ON SAS AND H.L.Q.

SAS					H.L.Q.				
Case	Rank		d_i	Rank A*	Case	Rank		d_i	Rank B**
1	5	8.5	3.5	14.5	1	5.5	8	2.5	18
2	4	1	-3	20	2	3.5	7	3.5	14
3	3	2	1	17.5	3	3.5	1	-2.5	20
4	7	18	11	5	4	2	16	14	5.5
5	6	14	8	9	5	17	29	12	8.5
6	11	12	1	17.5	6	11	13	2	19
7	13	32	19	2	7	14	31.5	17.5	2
8	8.5	20	11.5	4	8	9	23	14	5.5
9	10	22.5	12.5	4	9	5.5	20.5	15	3
10	15	25	10	6.5	10	12	24	12	8.5
11	24	31	7	10.5	11	26	36.5	30.5	10
12	21	27	6	12	12	14.5	28	13.5	7
13	17	26	9	8	13	14.5	22	7.5	12
14	19	22.5	3.5	14.5	14	20.5	25	4.5	13
15	28	38	10	6.5	15	18	36.5	18.5	1
16	16	36	20	1	16	19	33.5	14.5	4
17	34.5	37	2.5	16	17	27	30	3	16
18	34.5	39	4.5	13	18	31.5	39.5	8	11
19	33	40	7	10.5	19	36.5	39.5	3	16
20	30	29	-1	19	20	33.5	36.5	3	16

* A - Ranking of the difference between SAS test and retest

** B - Ranking of the difference between H.L.Q. test and retest.

G. COMPARISON BETWEEN IMPROVEMENT MADE ON SAS AND H.L.Q. (Cont.)

Case	Rank B Rank A	d_i^2
	d_i	
1	3.5	12.25
2	-6	36
3	2.5	6.25
4	0.5	0.25
5	-0.5	0.25
6	1.5	2.25
7	0	0
8	1.5	2.25
9	0	0
10	2.5	6.25
11	0.5	0.25
12	-5	25
13	4	16
14	-1.5	2.25
15	-5.5	30.25
16	3	9
17	0	0
18	-2	4
19	5.5	30.25
20	-3	9

$$d^2 = 191.75$$

$$r_s = \frac{\Sigma x^2 + \Sigma y^2 - \Sigma d^2}{2\sqrt{\Sigma x^2 + \Sigma y^2}} = \frac{331.66 + 330.66 - 191.75}{2\sqrt{331.66 + 330.66}} = \frac{662.32 - 191.75}{2 \cdot 330.5} = \frac{450.57}{661} = 0.72$$

$$\text{where } \Sigma x^2 = \frac{N^3 - N}{12} = \Sigma T_x = \frac{(20)^3 - 20}{12} = \left(\frac{2^3 - 2}{12} + \frac{2^3 - 2}{12} + \frac{2^3 - 2}{12} + \frac{2^3 - 2}{12} \right)$$

$$\text{and } \Sigma y^2 = 331.66 - 1 = 330.66$$

$$r_s = 0.72 \quad (P < 0.01)$$

There is a significant relationship between the improvement made on the SAS and H.L.Q.

II. WILCOXON MATCHED PAIR SIGNED RANKS TEST

1. SAS Test and Retest

Case	d_i	Rank of d_i
1	-2	-1
2	122	16
3	104	15
4	8	3.5
5	206	20
6	140	17
7	144	18
8	94	13
9	68	12
10	32	8
11	62	11
12	20	6.5
13	98	14
14	182	19
15	8	-5
16	20	6.5
17	42	9
18	-3	-2
19	44	10
20	-12	-5

$$T = 8 \quad (P < 0.01)$$

$$N = 20$$

Therefore there is a significant difference between test and retest. The Null hypothesis that there is no difference between test and retest has been rejected at 0.01 level of significance.

II. H.L.Q. Test and Retest

Case	d_i	Rank of d_i
1	-5	-6.5
2	30	18
3	26	14.5
4	5	6.5
5	44	20
6	28	17
7	35	19
8	24	12.5
9	12	10
10	26	14.5
11	13	11
12	10	9
13	27	16
14	24	12.5
15	5	6.5
16	4	4
17	1	1.5
18	1	1.5
19	5	6.5
20	2	3

$$T = 6.5 \quad (P < 0.01)$$

$$N = 20$$

Therefore there is a significant difference between test and retest.
 The Null hypothesis is that there is no difference between test and retest.
 This has been rejected at a level of significance of $P = 0.01$.

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